CONTINGENCY CONSTRUCTION PLANNING IN THE U. S. ARMED SERVICES, INCLUDING THE EXTENT OF MODULAR CONSTRUCTION

A Special Research Problem

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CHAPTER I

INTRODUCTION

The purpose of this paper is to examine and compare the contingency construction plans and capabilities of the United States Navy, Air Force, and Army.

A contingency is an event or possibility that must be prepared against. [Webster84] For the purposes of this paper, a contingency will be further limited to a situation in which the military would be required to operate in locations without adaquate existing facilities. A contingency would most likely be a politically based conflict, although it could be a natural disaster; in either case, military construction forces would be called upon to provide the necessary facilities. The facilities needed could be of any variety, but this paper will exclude the softwall, tent type structures used for short durations, and whose erection can not fully be considered construction.

The construction of any facility requires a workable plan or design, trained personnel, appropriate tools and equipment, and a sufficient supply of building materials. The contingency construction capabilities of the Armed Services will be measured by examining these requirements, focusing here on the construction design plans and the construction forces, as these can not be readily procured through a military supply system as the need arises. Unlike materials and equipment, designs and personnel require a considerable amount of time to develop or train.

The construction forces of an Armed Service will include active duty, reserve, and National Guard units, organic to that branch of service, whose primary mission is to provide construction services as described above. Civilian contract labor has been used on some military projects, but the need for a short response time and the potential danger to the construction worker in such a contingency will preclude their discussion in this paper.

Special emphasis will be paid to the extent of modular construction in each Service's contingency construction program. Modular construction refers to the complex relationship between

standardization and flexibility. A highly modular facility would be one built using standard tools, methods, materials, and design. The modularity of a structure increases with the ease with which it can be converted to other uses, or with which it can be relocated and reused.

CHAPTER II

UNITED STATES NAVY

Overview of Navy Contingency Construction

The Navy first realized its need for contingency construction management in World War II due to the logistical problems encountered in the Pacific Island Campaigns. During the war, Plan Orange was conceived and enacted, its purpose was to overcome these problems and enable the Navy to fight a war with a front line moving over thousands of miles. Much of the plan had to do with Naval sea and air strategies, but it also included methods to free the U. S. Fleet from its dependence on rearward bases as the forward units advanced. The plan set forth a logistics doctrine by which the fleet could carry logistic bases forward with their advance. [31NCR LTG]

The Navy plan has continuously evolved since then and the current system in use is the Advanced Base Functional Components

System (ABFC). This system contains a listing of 'components' in [OPNAV41 87]. These components include all that is required to complete a certain task. In a contingency situation, Commanders would use this information as a guide to order the needed facilities and approximate the amount of construction required. Planning information is available to the construction forces in the form of construction plans, crew make-up, and lists of needed materials and equipment.

The Naval Construction Force (NCF) is made up of heavy construction units designed to complete missions including the construction of these pre-planned facilities, and specialty units designed to meet the special needs of the Navy.

Each of these areas will be discussed in greater detail below.

Naval Construction Forces

General

The Naval Construction Force (NCF) was formed in World War II to support the war in the Pacific by constructing and improving base capabilities as part of the island campaigns. There were over

10,000 Officers and 240,000 Enlisted "Seabees" during World War II. [USMC13-4 90] The NCF was involved in the Korean War, and was used even more extensively in Vietnam.

Today, the NCF mission is still to provide responsive construction capability to Navy, Marine Corps, and other forces in military operations. The NCF is tasked with the construction and maintenance of base facilities, the repair of battle damaged facilities, and shall conduct defensive operations as required. The secondary mission of the NCF is to conduct disaster control and recovery operations, including emergency public works functions, in time of emergency or disaster. [OPNAV5450 90] The NCF is capable of executing its mission in any environment across the spectrum of conflict. The larger NCF units require sealift, while smaller units are airliftable. In times of war, NCF units are normally attached to Marine Air-Ground Task Forces (MAGTFs) and to Navy bases. [USMC13-4 90] and [NFP1049 89]

The Naval Construction Force (NCF) is made up primarily of the following types of units:

•Naval Construction Regiment (NCR)

•Naval Mobile Construction Battalion (NMCB)

•Naval Mobile Construction Battalion Air Detachment (AIRDET)

•Amphibious Construction Battalion (PHIBCB)

•Construction Battalion Maintenance Unit (CBMU)

•Underwater Construction Team (UCT)

Naval Construction Regiment

There are two active duty and eight reserve Naval Construction Regiments (NCRs). [NFP1R 87] They are small headquarters and staff type units with no construction capabilities, their basic mission within the NCF is command and control. Each Regimental Command consists of 13 Officers and 51 enlisted Seabees. [USMC13-4 90] They are deployed to coordinate the construction effort when more than one NCF unit is working in one area, generally used to coordinate from two to four NMCBs or other NCF units. [OPNAV3501 78]]

Naval Mobile Construction Battalion

The Naval Mobile Construction Battalion (NMCB) is the backbone of the NCF, there are currently eight active duty and seventeen reserve NMCBs. [NFP1R 87] Active duty NMCBs and

reserve NMCBs have the same mobilization, defensive, combat, and construction missions. [OPNAV5450 90] There are 24 Oificers and 745 enlisted Seabees per NMCB at full strength.

The NMCB is capable of performing a wide variety of large scale construction tasks including construction, repair, and maintenance of all Navy and Marine facilities. They are specifically trained in the construction of advanced bases, including: roads, airfields for fixed and rotary wing aircraft, waterfront structures, tank farms, technical buildings, camps for personnel, water, lighting, communication systems, and other requirements. [OPNAV41 87] When conducting these construction operations, the NMCB is tasked in [OPNAV3501 78]] with being capable of:

- Staffing jobs for two-ten hour shifts, seven days per week.
- Performing horizontal and vertical construction simultaneously.
- Performing all defensive functions simultaneously.
- Performing intermediate maintenance on its own equipment simultaneously with construction operations.
- Operating in all climates (cold weather to tropical to desert).
- "Over the Beach" operations supporting Marine amphibious assaults.

Each NMCB has over 275 pieces of construction equipment suited to a wide variety of tasks. The equipment list includes a 1500 foot well drilling rig, mobile cranes (to 35 tons), front end loaders, graders, bulldozers, rollers, concrete mixers, pumps, generators (to 200 KW), compressors (to 750 CFM), trucks of various sizes, and other specialized equipment. [USMC13-4 90] A selected list of equipment is attached as Appendix A.

An NMCB that is already deployed overseas is tasked with being capable of redeploying with all its equipment within a maximum of six days. When an NMCB is at its homeport in the United States, it is tasked with being able to deploy with all its equipment within a maximum of ten days. No matter where it is located, an NMCB is able to deploy an Air Detachment (AIRDET), of approximately 90 men plus equipment, in a maximum of 48 hours. [OPNAV5450 90]

Construction materials are not shipped with the NMCB, they depend on receiving materials at their destination. Materials would be prepositioned or they would be shipped separately by a supply unit. [OPNAV5450 90]

In addition to their normal deployment capabilities, any NMCB may be called upon to deploy as a "light battalion" within 72 hours. This concept means they would deploy the entire battalion, or just certain task oriented elements, without their full compliment of equipment; they would deploy with only personnel, weapons, small tools, and communication equipment. The construction equipment and materials would have to be at a local base, be prepositioned war reserve, or obtained from the host nation. [OPNAV5450 90]

There are four standard task oriented elements an NMCB must be ready to deploy in a 'light' configuration in accordance with [OPNAV5450 90]:

a) Rapid Runway Repair (RRR) Element, capable of repairing nine craters simultaneously. They are also capable of repairing electrical, fuel, and water systems associated with airfield operations.

b) Utilities War Damage Repair (WDR)/Base Utilities Support Element, their primary mission is to repair war damaged utilities. A secondary mission exists for construction of temporary troop berthing and augmenting base maintenance.

c) Structural War Damage Repair/Vertical Construction Element, their primary mission is to repair war damaged structures using expedient methods such as shoring, weather protection and emergency repair. Their secondary mission includes construction of temporary troop berthing and aircraft hangar facilities.

d) War Damage Repair/General Construction, this is the least specialized of the four groups. Their primary mission is to perform all types of war damage repair except Rapid Runway Repair, their secondary mission is to perform all types of expeditionary construction.

NMCB Air Detachment

An NMCB Air Detachment (AIRDET) is a task organized element of an NMCB, its mission is to repair war damage and to construct urgent projects as needed. The scope of potential projects is similar to those for the parent NMCB.

The generic unit consists of two Officers and 87 Enlisted Seabees and has 38 pieces of construction equipment (see Appendix B), it is limited to 250 to 300 short tons (1 short ton = 2,000 pounds) of air shipment. The generic AIRDET is only used when specific task

information is not available. Under normal circumstances, the NMCB will tailor the number and types of both personnel and equipment for the task at hand. [USMC13-4 90]

Amphibious Construction Battalion

An Amphibious Construction Battalion (PHIBCB) is a specialized NCF unit designed to support beach operations, they participate in the initial assault and early phases of an amphibious landing. The PHIBCB will construct a pontoon causeway pier (either floating or elevated), provide pontoon lighterage (ferry services), construct and maintain a tent type beach camp, install and operate Amphibious Assault Bulk Fuel Systems (AABFS), and provide beach salvage operations.

There are currently two active duty and no reserve PHIBCBs. Each PHIBCB consists of 22 Officers and 446 Enlisted personnel. [USMC13-4 90]

Construction Battalion Maintenance Unit

The Construction Battalion Maintenance Unit (CBMU) is a small specialized NCF unit whose mission is to provide maintenance, operation and repair of public works and utilities at an advanced

base after the constructing unit has departed. The CBMU also provides operation and maintenance of automotive and construction equipment, and maintenance of materials handling equipment. The CBMU has some construction capabilities, so it can perform maintenance, repair and minor construction of buildings, waterfront facilities, runways and other airfield facilities (including matting surfaces).

There is currently only one active duty and no reserve CBMUs, it has one Officer and 69 Enlisted Seabees. [USMC13-4 90]

Underwater Construction Team

The Underwater Construction Teams (UCTs) are the most specialized units in the NCF. As their name implies, the UCTs construct, inspect, maintain, and repair underwater facilities. As the only units of this type in the Navy, nearly all Naval underwater engineering, construction, and repair is their responsibility. Typical tasks vary widely, from work on sophisticated underwater surveillance systems to pier pile inspection.

UCTs are self-sufficient in their underwater construction capabilities, they travel with and maintain their own dive, safety,

and construction equipment.

There are currently only two active duty and no reserve UCTs, each is manned by three Officers and 52 Enlisted Seabees. [USMC13-4 90] Each UCT is capable of dividing up into a maximum of five simultaneously working details. [OPNAV3501 78]]

Summary of Naval Construction Forces

The bulk of Naval and Marine contingency construction will be performed by Naval Mobile Construction Battalions (NMCBs), there are approximately 20,000 personnel currently in such active duty and reserve construction units. These units are large and sufficiently equipped enough to be able to perform nearly any required contingency project. For extremely large projects, or for an unusually large number of projects in one location, NMCBs may be combined and the construction management role is shifted to the Naval Construction Regiment. Navy planners envision the NCF dividing their forces over two roles in a potential conflict, some units will be in direct support of Marine Air-Group Task Forces (MAGTFs) while the other units will support advanced Navy bases. The MAGTF units would likely be in full configuration, as prepositioned assets are

less likely, and anticipated tasks are difficult to preplan other than the need for heavy construction. The units supporting advanced Navy bases in the initial stages of conflict will most likely be NMCBs in their light configuration due to their more rapid response time and the relative logistical ease in prepositioning assets. [NFP1049 89]

CONSTRUCTION PLANS AND DESIGNS

The Navy's plans and designs for contingency construction are part of the Advanced Base Functional Components System (ABFC). This system has a three tier structure; 'components' are the largest, they are made up of 'facilities', which are made up of 'assemblies'.

Components contain the personnel, materials and equipment that perform a certain task or that accomplish a specific mission at an advanced base. [NFP437 86] There are 206 different components ranging from a 100 Man Tent Camp to a Base Power Plant to an Assault Craft Unit. The components are broken into the following 11 categories in [OPNAV41 87]:

A- Administration
B- Harbor Operations
C- Communication

D- Supply
E- Ship Repair
F- Cargo Handling Battalion
H- Airfield
J- Magazine
M- Hospital
N- Personnel Housing/Camps
P- Construction Forces

ABFC Manual - OPNAV 41P3B

The [OPNAV41 87] is used by higher echelons in determining their component needs at an advanced base, and it also provides the information needed for non-construction logistics, such as procurement and shipment.

ABFC Manual - NAVFAC P-437 --- General

The [NFP437 86] is used by the construction forces to build the needed components. It provides information at the component, facility, and assembly levels.

The components and facilities listed in [NFP437 86] are based on the most generic set of assumptions because of its potential to be located anywhere in the world. The ABFC system does not contain exactly what will be needed for every situation, so it is designed in a way that can and should be tailored by the base development planner. The planner should take into account the specific mission,

location, unit composition, and the availability of assets in that location. The planner should use these specifics to adjust which facilities, and in what quantities, are necessary for that component; likewise, he should tailor the type and number of assemblies for each required facility. Another facet in tailoring the facilities is the location coding on assemblies. Assemblies marked with a "T" are for use only in Tropical areas, those marked with an "N" are used only in Northern climates, unmarked assemblies are used in either climate. [NFP437 86]

An example of the information in [NFP437 86] is provided in Figure 1 for Component A18, a small Officer in Charge of Construction (OICC) Office. The following page is the component description:

COMPONENT A18 OCT 22

OFFICER IN CHARGE OF CONSTRUCTION (OICC)

PROVIDES THE NECESSARY PERSONNEL STAFF; OFFICE BUILDING EQUIPMENT AND ADMINISTRATIVE SUPPLIES TO ESTABLISH AN OFFICER IN CHARGE OF CONSTRUCTION (OICC) OFFICE IN A CONTINGENCY AREA TO ADMINISTER SPECIFIC CONSTRUCTION ARCHITECTURAL AND ENGINEERING CONTRACTS FOR THE DEPARTMENT OF DEFENSE.

SITE PLAN 6027769 MAJOR REV 05 12 78

FACILITY	DESCRIPTION	FACILITY CAPACITY	QTY	COMPONENT CAPACITY	WEIGHT SHORT TON	CUBE MEAS TON	DOLLAR VALUE	CONST EFFORT MANHOURS
141 600	PHOTOGRAPHIC BUILDING 20FTX24FT PNL	480 SF	1	480 SF	12.4	27.1	13,261	543
→310 44A	MATERIALS TESTING BLDG 40X100RF	4000 SF	1	4000 SF	62.6	95.0	37,231	3,038
610 10T	ADMINISTRATION OFFICE 60X80 PNL	4800 SF	1	4800 SF	104.9	185.2	104,157	2,502
610 10Y	ADMINISTRATION BLDG	7200 SF	1	7200 SF	78.5	123.3	40,249	2,594
812 30W	DISTR LINE UGND 250MCM 1 AND 6 AWG	750 LF	1	750 LF	1.4	1.6	14,599	247
832 10BP	SANITARY SEWER 4 INCH	300 LF	2	600 LF	.6	2.4	660	76
842 10CF	WATER DISTRIBUTION LINE POTABLE 2N	300 LF	2	600 LF	.4	1.2	718	136
851 10A	ROAD WITH DRAINAGE 1 MILE	14000 SY	1	14000 SY	38.8	76.3	16,206	3,330
				TOTAL NORTH (TEMPERATE)	299.6	512.1	227,081	12,466
				TOTAL TROPICAL (BASIC)	294.6	494.1	220,125	12,396

COMPONENT A18

	CONST STO	LAPSED DAYS	LAND ACRES	POWER KVA CONNECTED	POWER KVA DEMAND	WATER GPD	SEWER GPD	FUEL GAL/300DAYS HEATING OSL	FUEL GAL/300DAYS HEATING MOGAS	FUEL GAL/300DAYS PWR GEN OSL
TEMP	0		.5	103	82	1,700	1,700	8,900	0	0
SKILLS	MANHOURS		EA	BU	UT	CE	SW	EO	CM	MS
			166	2,247	1,036	1,005	812	2,320	0	4,880

COMPONENT B22

Figure 1, Component A18 from [NFP437 86].

FACILITY 310 44A PLANNING FACTOR NA

MATERIALS TESTING BUILDING 40X100RF

MAVFAC DRAWING NUMBER 8027774 MAJOR REV. 03 04 75

ASSEMBLY	DESCRIPTION	ZONE	QTY.	WEIGHT POUNDS	CUBIC FEET	DOLLAR VALUE	CONST EFFORT MANHOURS
			17	10,132.9	410.2	3,218.44	408
11000	PARTITION W/WOOD DOOR 160 SQ FT		1	155.0	4.7	60.00	2
11047	PARTITION METAL TOILET W/DR		1	7.4	.3	43.30	1
11057	PILASTER METAL TOILET		1	150.2	16.7	531.28	30
11200	DOOR ASSEMBLY DOUBLE		2	1,316.0	48.0	245.42	18
11801	CEILING ASSY STUD F/HEAD* 10X16		1	16,522.5	1,317.8	4,851.81	786
11702	INSULATION KIT 40X100RF S OP BLDG		1	84,327.5	848.4	2,047.18	337
12050	FOUNDATION/FLOOR SLAB 6N 0X100 RF		1	46.1	.4	5.45	20
20840	PIPING FO F/30KW OSL DRIV N GEN		2	790.8	92.4	79.50	44
20703	TANK FUEL 275 GAL W/PIPING	N	1	1,606.7	115.8	1,068.56	10
25002	HEATER SPACE 200000 BTU		1	11.0	.1	11.18	1
26001	LOUVER DOOR FIXED 12 X 6N		3	393.5	27.2	517.92	12
26120	FAN EXHAUST WALL MTD 630 CFM		1	223.4	19.3	286.49	29
27101	PIPING DWV F/HEAD SMALL		1	31.8	2.7	34.29	15
27300	PIPING DWV F/MATERIALS TESTING BLDG		1	89.7	2.1	301.82	41
27412	PIPING CW-HW F/HEAD SMALL		1	19.1	.1	44.47	7
27599	PIPING CW-HW F/MATERIALS TEST BLDG		1	65.8	24.4	79.75	5
27710	HEATER WATER 8 GAL ELECTRIC		1	74.8	3.2	158.24	10
29002	LAVATORY VITREOUS CHINA		1	181.5	15.5	118.12	12
29011	WATER CLOSET TANK TYPE V.C.		1	177.8	12.9	342.21	12
29020	SINK SERVICE C.I. ENAMELED		2	68.0	4.5	187.42	4
29022	DRAINBOARD SET		2	507.3	8.7	1,291.38	16
29028	INTERCEPTOR SEDIMENT CI FL MTD		2	133.7	19.8	311.38	16
29029	SINK SERVICE		1	134.9	17.1	298.75	8
29036	FOUNTAIN DRINKING 10 GAL		4	973.2	101.9	1,522.48	104
30021	RECEPTACLE CKT F/40 DUPLEX RCPT		1	512.1	34.3	972.55	78
30101	LIGHTING ASSY INCAN 22FC/4000SF		1	611.0	11.6	358.71	21
31001	ELEC SERVICE ENTRANCE ASSY 1AWG		1	58.7	2.1	418.24	14
31213	CKT BRKR PANEL 125A 208V 3PH 4W 18P		1	24,847.0	572.0	15,500.00	648
40002	BUILDING RF STEEL 40X100		1	978.8	69.5	1,599.79	288
45413	DUCT HVAC F/MATERIALS TESTING BLDG		1	.0	.0	.00	
52004	SITE PREP F/4000SF BLDG W/SLAB		1				

	SHORT TON	MEAS TON				
TOTAL NORTH (TEMPERATE)	82.8	95.0	125,128.0	3,799.5	37,231.11	
TOTAL TROPICAL (BASIC)	81.8	92.1	123,521.3	3,883.9	38,164.55	

FACILITY 310 44A PRIMARY UNIT OF MEASURE 4,000 SF SECONDARY UNIT OF MEASURE 0

FACILITY 310 44A PLANNING FACTOR NA OCT 22

CONST STO	LAPSED DAYS	LAND ACRES	POWER KVA CONNECTED	DEMAND	VOLTS	PHASE	WATER TOT. GPD	WATER PEAK GPM	SEWER GPD	RECOV. CODE
TEMP	37	.11	27	19	208	3	200	30	200	B

FUEL (GAL/300DAYS) HEATING	PWR GEN		SKILLS MANHOURS							
OSL	MOGAS	OSL	EA	BU	UT	CE	SW	EO	CM	MS
1,400	0	0	12	745	143	128	637	95	0	1,280

Figure 2, Facility 310 44A from [NFP437 86].

ASSEMBLY 11000 ZONE 11000

PARTITION WITH WOOD DOOR 160 SQ FT

WOOD STUDED PLYWOOD PARTITION FOR 20X48 AND 40X100 BLDGS

NAVFAC DRAWING NUMBER 303649 MAJOR REVISION DATE 08 10 77

CDG	STOCK NUMBER	DESCRIPTION	UI	QTY	WEIGHT POUNDS	CUBIC FEET	DOLLAR VALUE
9Z	5305-00-716-8128	SCREW CAP 0.5-13X2.5N UNC HEX HD CD PL STL	EA	18	4.32	.0432	1.98
9Z	5310-00-768-0318	NUT 0.50-13 UNC CO PL STL	EA	18	1.62	.0162	.36
9Z	5310-00-809-3079	WASHER FL 0.56N ID 1.39N OA DIA RND CD PL STL	PG	1	1.16	.0116	6.18
	9	(250 PER PG)					
9Z	5315-00-198-5617	NAIL FINISHING 6D GALV	LB	3	3.00	.0600	1.47
9Q	5315-00-753-3880	NAIL COMMON BRITE 4D	PG	1	5.00	.2000	2.75
9Q	5315-00-753-3884	NAIL COMMON BRITE 12D	PG	2	10.00	.4000	4.36
9Z	5340-00-229-4248	HINGE BUTT 3 1/2NX3N - 6 STL BODY ZINC COATED	EA	2	.70	.0140	2.46
	8	BRASS/STEEL PIN					
9Q	5340-00-685-1202	LOCKSET RIM 1-1 3/40R	SE	1	1.25	.0125	10.71
9C	5510-00-220-6080	LUMBER 1X6 S4S	BF	18	36.00	1.4940	3.96
9C	5510-00-220-6194	LUMBER 2X4 S4S	BF	140	280.00	11.6200	35.00
9C	5520-00-240-8859	DOOR FLUSH CORE 36NX80NX1 3/4	EA	1	11.00	3.0000	30.00
9C	5530-00-129-7721	PLYWOOD EXT 1/4X48X96	SH	11	242.00	7.2600	90.09
		ASSEMBLY 11000		TOTAL	596.05	24.1315	189.32

FUEL (GAL/300AYS)

HEATING DSL	MOGAS	PWR GEN DSL	EA	SKILLS MANHOURS BU	UT	CE	SW	ED	CM	MS	CONST EFFORT MANHOURS
0	0	0	0	12	0	0	0	0	0	12	24

NOTE - CREW SIZE: 1 BU, 1 CN

Figure 3, Assembly 11000 from [NFP437 86].

ABFC Manual - NAVFAC P-437 --- Component Level

Figure 1 begins with the mission and capacity of Component A18, the Small Officer in Charge of Construction (OICC) Office. The next item is the Site Plan Number, this number is the Naval Facilities Engineering Command (NAVFAC) Drawing Number. This site plan is included in Volume I of the [NFP437 86]. The plan shows the general layout of the structures used in the component.

The recommended facilities used for the component are then listed in Facility Number order. The first three digits of the Facility number are the Department of Defence Category Code, the general codes are as follows [NFP437 86]:

100 Operational and Training
200 Maintenance and Production
300 Research, Development and Evaluation
400 Supply
500 Hospital and Medical
600 Administrative
700 Housing and Community Support
800 Utilities and Ground Improvement
900 Real Estate

A full listing of category codes are listed in [NFP72 76]. The alpha suffix for each facility are used to identify the different types, sizes, and layouts of facilities that perform the same functions.

The name of the facility and the capacity of one such facility is given. Next the quantity of each facility type is given, then it is multiplied by the capacity or size of each facility to make the component capacity. The rest of the columns listed are based on the total number for each facility type, not the unit value for the facility. These columns show the Weight in short tons (2,000 pounds), the Volume or cube in measurement tons (40 cubic feet per measurement ton), the Cost in dollars, and the required Construction Effort in man-hours. [NFP437 86]

The construction effort was computed using [NFP405], assuming 'average construction conditions', it can also be used to make adjustments for the specific conditions that will be encountered in the construction of the component. [NFP437 86]

The next field is "CONST STD" or Construction Standard, which is set by the Joint Chiefs of Staff. The possible categories are [JCS3]:

a) INIT or Initial, built for a requirement of less than 6 months.

b) TEMP or Temporary, for a requirement of 6 to 24 months.

"LAPSED DAYS" is the time required to construct the component under optimal conditions. "LAND ACRES" is the amount of land required for the component, in acres. The power in kVA is shown as connected and in expected load demand. Water and sewer demand are given in gallons per day, the expected fuel usage is for a 30 day period. [NFP437 86]

Finally, the man-hours of construction effort are distributed by type of skill required. The first seven are the Seabee Enlisted ratings (EA=Engineering Aid, BU= Builder or Carpenter, UT=Utilitiesman or plumber, CE= Construction Electrician, SW= Steelworker, EO= Equipment Operator, CM= Construction Mechanic) and the eighth, NS= Non Skilled or laborer. [NFP437 86]

ABFC Manual - NAVFAC P-437 --- Facility Level

One of the facilities required for the Small OICC Office is FACILITY 310 44A, a Materials Testing Building, 40 by 100 feet, Figure 2 is the information given for this facility. [NFP437 86] The NAVFAC Drawing Number is given, and the required assemblies are then listed in Assembly Number order. The weight, volume, dollar

value, and estimated construction man-hours are given as totals for each line. [NFP437 86]

The rest of the information is the same as that given for a component, as described above, with the following exceptions:

A) In addition to the primary capacity of the facility, a secondary capacity is given, it is an alternate measure of capacity. An example would be a primary capacity in square feet and a secondary capacity being in number of personnel capable of being served. Secondary capacities are listed in [NFP72 76].

B) Recoverability Codes are given to facilities, they indicate how relocatable of recoverable the facility is. The four possible Recoverability Codes are shown in Figure 4 [NFP437 86]:

A	Relocatable	Designed specifically to be easily erected, disassembled, stored, and reused.
B	Pseudo-Relocatable	Not specifically designed to be easily relocatable, but could be with considerable effort and loss of parts.
C	Nonrecoverable	Not specifically designed to be easily relocatable, cost of recovery would be more than 50% of replacement cost.
D	Disposable	Temporary structures of low cost and easy construction, not designed for reuse.

Figure 4, Recoverability Codes

In this example, the Recoverability Code is B, Pseudo-Relocatable (common for most rigid frame buildings). [NFP437 86]

ABFC Manual - NAVFAC P-437 --- Assembly Level

One of the assemblies required for the Materials Testing Building is ASSEMBLY 11000, a 160 square foot Partition with Wood Door, Figure 3 is the information given for this assembly. [NFP437 86] The assembly lists each piece of material, in National Stock Number (NSN) order, required to build it. The use of NSNs greatly simplifies the logistics in ordering supplies from any U. S.

Government Supply Center.

The other information provided for an assembly is similar to what is provided for a facility except for the crew size. The assemblies give a recommended crew size, and with it are the recommended ratings of the crew members. In this example, the recommended crew is '1 BU and 1 CN', as described above, BU is a Builder (the Seabee rating for a carpenter). The CN is an abbreviation for Constructionman, this is another name for Non-Skilled or laborer. [NFP437 86]

Extent of Modular Construction

The Navy is at several different levels of modularity in its contingency construction plans. The ABFC system provides modular type construction designs for all contingencies, all areas of Naval contingency construction are at least at this level of modularity. ABFC designs are flexible and many of the pre-designed structures have multiple uses. Some of the Navy designs are modular only as far as this design stage. Woodframe buildings, for example, are pre-designed in ABFC, but they are not all pre-procured and packaged in

'kits', though some ABFC materials are at this stage. Airfield AM-2 matting is an ABFC item that has been procured, and it is stored in small 'kits', ready to deploy. [OPNAV41 87] Another form of Navy construction that is modular is the Navy Pontoon System, the materials for this system have already been procured. Causeways may be assembled from pontoons, or they may be pre-constructed and transported by ship. [NFP401 82] These examples of modular construction in the Navy are discussed below in greater detail.

Portable Airfield Surfacing Material

The construction of an advanced base airfield, using modular matting, is a component in the Navy ABFC system. There is enough AM-2 aluminum matting in the component to surface a runway (8,000' x 96'), interconnecting taxiways (approximately 2,100' of 72' wide taxiway), and an apron (624' x 320'). The runway length may be ordered in 2,000 foot increments. The completed airfield is designed to accommodate naval aircraft using conventional take-off and landing methods. The kit includes aircraft tie-downs, adapters that place engine blast protection around the edge of the field, clamps and stakes for securing the matting at the edge of the field,

plus extra matting to replace those that are damaged. [OPNAV41 87]

The entire airfield package is expectedly large, weighing over 3, 660 tons, with a volume of 5,420 Measurement tons (approximately 217,000 cf). Two 13 man crews are capable of installing about 12,000 sf in six hours. Therefore, an 8,000 foot runway alone would take just under 10,000 man-hours of construction effort, or about 384 crew-hours; this is not the full construction effort required though, as the airfield site must be leveled prior to assembling the matting. [OPNAV41 87]

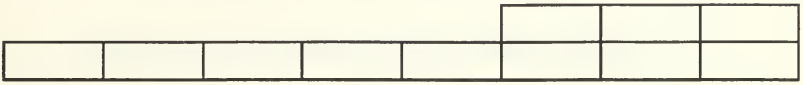
Navy Pontoon System

The Navy system is quite modular, it consists of only seven different pontoon types, called the P1, P2, P3, P4, P5, P6, and the P8. Pontoons are watertight units of welded 3/16 inch steel plate over a reinforcing framework of steel angles. Pontoon decks are designed to support a load of 32,000 pounds per axle (Association of State Highway and Transportation Officials (AASHTO) H-20 loading criteria). The P1 is the most basic pontoon and is used in every structure in the pontoon system. It's deck is approximately 5' x 7', is 5' deep, and weighs 2,060 pounds. [NFP401 82]

An Amphibious Construction Battalion (PHIBCB) can construct any of the pontoon structures, including causeways. These pontoons can be connected in different combinations to form pontoon causeways, barges, floating drydocks, floating cranes and derricks, bridge units, and wharves. [NFP401 82]

Floating causeways are made up of pontoons, that once assembled, form a roadway between ship and shore, providing for movement of vehicles, personnel, and supplies. Floating causeways can also be used as piers to unload small craft, or they can even be used as lighterage barges when provided with engines. A floating causeway has three types of sections; an inshore section that is used as a ramp to the beach, as many intermediate sections as needed to provide the causeway with the proper overall length, and an offshore section that will connect a ship to the causeway. These causeway sections can be preassembled and lashed to the sides of the ships. Each causeway section is approximately 90 feet long and 21 feet wide, weighs 67.5 tons, and can support a load of 100 tons. [NFP401 82]

An elevated causeway pier facility (ELCAS) provides the link between lighterage (barges) and the shore by bridging the surf zone. The standard configuration of the elevated causeway consists of twelve sections as shown below in Figure 5 [NFP401 82]:



INSHORE OFFSHORE

Figure 5, ELEVATED CAUSEWAY, STANDARD CONFIGURATION

Since the system is modular, the above configuration is simple to change into one that would better suit the needs of the situation. The construction of the elevated causeway is complicated by its need for piles being driven, but once driven, the causeway section is raised and locked in place by means of spudwells. Spudwells have an opening for the piling to fit through, which can either be internal to the causeway sections, or externally attached when the full width of the causeway section is needed for traffic. [NFP401 82]

CHAPTER III

UNITED STATES AIR FORCE

Contingency Construction on Air Bases - Division of Army and Air Force Responsibilities

The Air Forces's contingency construction needs are planned to be met by the combined efforts of Air Force construction forces and Army construction forces. To prevent duplication of effort, [AFR10 79] delineates the responsibilities of each for contingency construction, the following is a summary of those differences:

The Air Force is responsible for the operations and maintenance of Air Force facilities and installations. [AFR10 79]

The Air Force will provide emergency repair of war damage to air bases, but the Army will assist the Air Force in these emergency repairs when the requirement exceeds Air Force capabilities. The Air Force is not responsible for the repair or restoration of war damage to air bases beyond emergency repair, the Army is. To

understand this distinction, emergency repairs are defined as the least amount of immediate repair to damaged facilities necessary to accomplish the air mission. Emergency repairs are made using expedient materials and methods (i.e. cold-mix asphalt, portable generators and temporary utility lines). Emergency repairs also includes Rapid Runway Repair (RRR) to provide a minimum operating runway and a minimum supporting taxiway. Repair or restoration is a level above emergency repairs in that it brings a facility back to its operational capability, it is normally performed using materials similar to those used in the original construction of the facility. [AFR10 79]

The Air Force is responsible for force beddown of Air Force units and weapon systems, but it is not responsible for base development. The Army is responsible for assisting the Air Force with force beddown when the requirement exceeds the Air Force capability. The Army is also responsible for the development of Air Force bases, this includes the acquisition, improvement, replacement, construction, and/or expansion of terrain and facilities. Force beddown is the construction of facilities that support the takeoff and

landing of air weapons systems, and a further limitation of force beddown is that it must be done at an existing air base. [AFR10 79]

The Air Force is responsible for the Construction management of emergency repair of war damage and force beddown. The Army is responsible for the construction management of repair and restoration of war damage and base development. [AFR10 79]

Air Force Construction Forces

The Air Force has two types of organic construction units; Red Horse Squadrons are 404 person units capable of heavy construction, Prime BEEF Squadrons are 50 to 200 person units capable of repair and light construction. [AFR9 87] and [AFR3 79]

Red Horse Units

Red Horse Mission. Red Horse Squadrons are mobile, rapid deployment, heavy construction forces. Their mission is to provide repair to Air Force facilities that have sustained heavy damage from enemy attack or natural disaster, they also provide construction for beddown of weapon systems, and installation of utilities support. [AFR9 87] Beddown means providing expedient facilities to support

the launching and recovery of air weapons systems at an existing air base or a bare base. [AFR10 79] A bare base has a runway, taxiways, parking aprons, and an adequate source of water that can be made potable. In peacetime, Red Horse supports special operations such as an aircraft crash or a nuclear weapon accident recovery, and it can also operate contingency airfields. [AFR9 87]

Red Horse Capabilities and Size. Red Horse squadrons are capable of performing the following construction tasks: airfield lighting installation, concrete mobile operations, explosive demolition operations, expedient aircraft arresting barrier installation, materials testing, quarry operations, rapid runway repair, revetment erection, and water well drilling. [AFR9 87]

Red Horse units do not maintain or deploy with construction materials, they rely on prepositioning or transport from other units.

The number of Red Horse squadrons will go from seven to six in August 1990, three of the six are active duty, two are Air National Guard, and one is Air Force Reserve. Of the three active duty squadrons, one is stationed overseas, the other two are in the Continental United States. [Wiggs90]

Each squadron has a peacetime strength of 400 personnel and a wartime strength of 404 personnel. Appendix C lists the personnel, and Appendix D lists the equipment, assigned to a Red Horse Squadron. [AFR9 87] A full Red Horse squadron can provide approximately 47,400 effective manhours per month of vertical construction, and 39,300 effective manhours per month of horizontal construction. [RHCAP87]

Red Horse Echelons. A Red Horse Squadron can be deployed in three echelons, as described below:

Echelon One (RH-1) is a 16 person unit prepared to deploy within 12 hours of notification, it can operate independently for up to five days. RH-1's mission is to perform advanced airfield surveys, these include evaluating the pavement, facilities, and utility systems including the water supply. They also prepare a beddown plan, which normally includes the facilities and materials required, recommends the extent of Harvest Bare and Harvest Eagle utilization, and prepares a site layout for beddown of Red Horse Echelon Two (RH-2). Harvest Bare and Harvest Eagle are modular systems that will be discussed later in this section. [AFR9 87]

Echelon Two (RH-2) is a 93 person unit prepared to deploy within 48 hours of notification, the unit may operate independently for up to 60 days as long as consumables are supplied. All equipment assigned to echelon two is air transportable. [AFR9 87]

The RH-2 mission is to clear the land and perform earthwork necessary for drainage at an undeveloped location to be used for force beddown. They also erect Harvest Bare and Harvest Eagle facilities as required for force beddown. RH-2 can perform Rapid Runway Repair on up to two large or three small bomb craters in a four hour period. Deploying with the necessary equipment, but without the materials, they can perform emergency repair on bomb-damaged facilities using field expedient methods, and can install or repair utility systems required for force beddown. An RH-2 can also install expeditionary aircraft arresting barriers, perform explosive demolition operations, and can drill water wells. [AFR9 87]

Echelon Three (RH-3) is a 295 person unit prepared to deploy within six days of notification, they are capable of operating independently for an indefinite period of time as long as consumables are supplied. RH-3 personnel normally deploy by air,

but the equipment is normally deployed by surface movement, some of the equipment is not air transportable. [AFR9 87]

An RH-3 has the same mission and capabilities as an RH-2 in the areas of Rapid Runway Repair, explosive demolition operations, utility system installation, and the erection of Harvest Eagle and Harvest Bare facilities. In addition, the RH-3 mission provides heavy repair of bomb damaged facilities and utility systems, and can operate mineral product plants, including a crusher, batch plants, and a block plant. Not all RH-3's are identiacally equipped (Appendix D includes the differences), but all can operate on-site equipment. [AFR9 87]

Prime BEEF Squadrons

Prime BEEF Mission. The Air Force Civil Engineering Prime Base Engineer Emergency Force (BEEF) Squadrons are groups of 50, 100, 150, or 200 personnel attached to nearly every U. S. Air Force Base in the world. Prime BEEF units are also attached to Air Force "flying" units, and deploy with those units in a contingency. [AFR3 79] and [AFMFEL90]

With the small number of Red Horse Squadrons in existence, Prime BEEF Squadrons will be relied upon to conduct a large portion of light contingency construction on military air bases to be used in periods of war, and to respond to natural and manmade disasters. [AFR3 79]

The typical construction tasks that Prime BEEF Squadrons will perform in a contingency environment include the following [AFR3 79]:

a) Provide for Force Beddown. This will include site preparation; installing and operating mobile equipment and facilities, including portable shelters and utility systems; relocating, installing, repairing, and operating base support systems, including utilities, aircraft arresting systems, and facilities.

b) Providing emergency war damage repair. This will include Rapid Runway Repair, emergency utility systems, and facility war damage repair management.

c) Providing nonexplosive base denial. This includes disabling or destroying the runway, utility systems, roads, equipment, and facilities.

d) Provide Explosive Ordinance Reconnaissance necessary to locate live ordinance, and to estimate its potential hazard before war damage repair can begin.

e) Provide insect control.

Active duty Prime BEEF Squadrons are attached to active duty flying units and should be ready to deploy within 22 hours of notification. Air Force Reserve and Air National Guard Squadrons are attached to similar flying units and are ready to deploy in 28 hours after notification. Prime BEEF Squadrons deploy with tool kits, but no construction equipment, they depend on receiving the equipment on site. [AFR3 79]

Prime BEEF Training. In order to accomplish the tasks listed above, all Prime BEEF Squadrons are trained in the following areas [AFR3 79] : Military Sanitation Training includes control of communicable diseases, kitchen and mess sanitation, problems of extreme climate, field hygiene, first aid, and water purification.

The follwing special training classes are related specifically to contingency construction and the preparation of the work site [AFR3 79]:

Expedient Methods Training covers force beddown, field construction, repair, and destruction methods. Expedient beddown includes training with Harvest Eagle and Harvest Bare assets, which are modular structures described below. Training includes facilities layout and hardening, and utility systems. [AFR3 79]

Expedient Field Construction Training includes lessons on the construction of hardback tents, field latrines, earth berms, field utility systems, wood frame and pre-engineered buildings, and expedient bridges and culverts. [AFR3 79]

Expedient Repair and Destruction Training is how to minimally restore a damaged facility or system to operation with the least amount of time and effort, it includes the use of expedient materials and equipment. Facilities discussed include utilities, buildings, roads, and Rapid Runway Repair. [AFR3 79]

Explosive Ordinance Reconnaissance Training, this training is to accurately identify and describe any unexploded ordinance so that Explosive Ordinance Disposal Teams (not part of Prime BEEF) can clear the work site for emergency repairs. [AFR3 79]

Prime BEEF Squadrons. A Prime BEEF Combat Support 1 (CS-1) Squadron is an active duty group with a strength of 200 personnel, a CS-5 Squadron is of the same size and configuration except it is an Air Force Reserve or Air National Guard Squadron. Appendix E includes lists of personnel attached to each Squadron size. A CS-1 or CS-5 Squadron has a mission to provide beddown support for populations of 2,200 to 2,500 personnel using expedient or existing facilities and utilities; they are also to perform emergency repairs to war damaged facilities, including Rapid Runway Repair using AM-2 matting, fiberglass mats, or concrete slabs. [AFR3 79]

The 200 person Prime BEEF Squadron is considered the standard for the most critical wartime tasks. This unit has the size and skill distribution to perform Rapid Runway Repair while simultaneously performing emergency utility and facility repairs and maintaining its own command and control. When not performing war damage repair, this unit has the size required to accomplish force beddown while simultaneously sustaining operations and maintenance. One 200 person unit is capable of providing continuous support in low threat areas, if frequent and numerous follow-on air

strikes are not anticipated. Two 200 person units are required to provide continuous war damage repair in high threat areas where several waves of attack are expected over an extended period of time. [AFR3 79]

Manning restrictions and a lower threat level permit units of less than 200 personnel, these units are designed so that they may be combined at any time to a full strength, 200 person force. [AFR3 79]

A Prime BEEF Combat Support 2 (CS-2) Squadron is an active duty group with a strength of 150 personnel, a CS-6 Squadron is of the same size and configuration except it is an Air Force Reserve or Air National Guard Squadron. Similarly CS-3 and CS-7 are 100 person squadrons, active duty and reserve, respectively; and CS-4 and CS-8 are 50 person squadrons. These smaller squadron are designed so that they may be combined to the standard 200 person configuration. Any Prime BEEF Squadrons can be combined as long as the total is 200 personnel and there are no more than two squadrons combined to meet that number. The make up of these smaller units was accomplished by proportionally reducing the

number of each skill, so smaller units can perform the same variety of tasks as the larger units, but they will have different operating capacities due to unit size. This method of structuring similar skill mixes enables Prime BEEF units to be readily combined to form larger units, since skill make up and unit capabilities will not be affected. [AFR3 79]

Prime BEEF Special Teams. Prime BEEF Units also include special teams that can be used as required, the make up of these units is shown in Appendix F. The following special teams are used in contingency construction scenarios [AFR3 79]:

Regional Wartime Construction Manager (RWCM) Team, also called an S-3, is a 20 person team that provides senior management as the RWCM for U. S. engineering forces in the operating area. [AFR3 79]

Civil Engineering Maintenance, Inspection, Repair, and Training (CEMIRT) Team, also called an ES-1, is a 7 person team that provides expert assistance in the repair and troubleshooting of generators and electrical distribution lines. [AFR3 79]

Pavement Evaluation Team, also called an ES-2, is a 4 person team that provides technical expertise and assistance in the design, construction, repair, and maintenance of airfield pavements. [AFR3 79]

Construction Plans and Designs

As the Air Force is linked to the Army in contingency construction operations, so are they linked in construction designs. The Air Force will use construction designs that are part of the Army Facilities Component System (AFCS), described later. [AFR10 79]

The Air Force is independent of the Army in construction planning. As discussed above, the Air Force is responsible for force beddown, which is the construction of facilities that support the takeoff and landing of air weapons systems, such work to be performed only at an existing air base or bare base. [AFR10 79]

Bare Base Planning Guide: AFP 93-12

An Air Force publication, "Contingency Response Procedures, Bare Base Conceptual Planning Guide" [AFP12], encompasses their plans in determining what facilities will be needed, and how to locate

them, on a bare base.

Air Force planning is based on being given a bare base from the Army and then using Air Force construction forces to complete all force beddown construction within 30 days. This schedule is based on being able to launch the first USAF aircraft within 72 hours of arriving at the bare base. The 72 hour requirement means that the runway, taxiway, parking aprons, barriers, communications, and fueling and arming capabilities are operational. Figure 6 is the Critical Path Method Diagram for the 30 day construction schedule. [AFP12]

Figure 6 is the Critical Path Method diagram for this 30 day schedule. [AFP12]

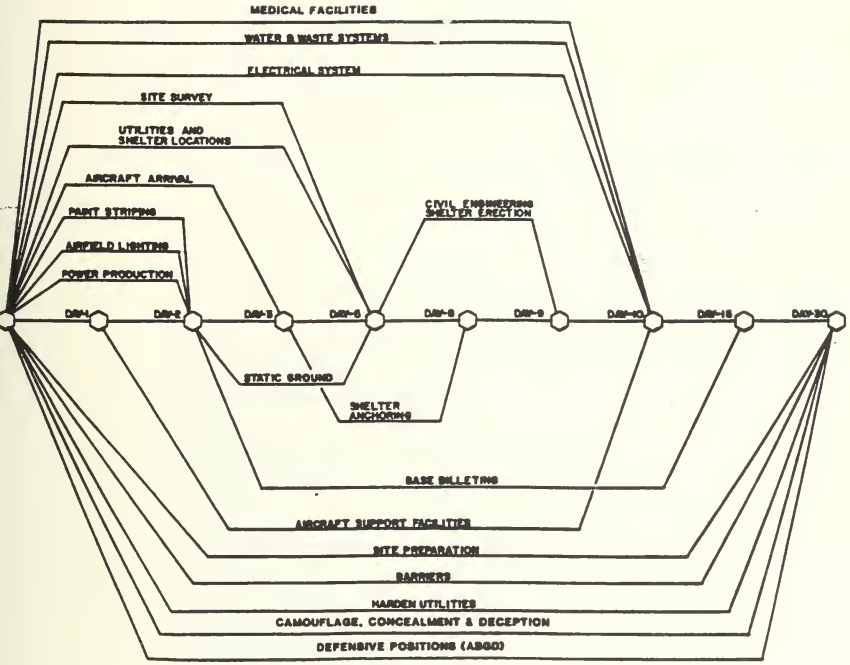


Figure 6, Air Force Critical Path Method Diagram [AFP12]

The 30 day schedule does not show the phasing of the utility systems. It is planned that expedient water, electrical, and waste facilities are set up first, then work would proceed on the final or long term utility systems. In order to highlight this, the following are the Air Force construction priorities for an air base, in order of highest to lowest priority [AFP12]:

- •Runway preparation (sweeping, painting, etc.).
- •Runway edge and approach lights.
- •Water treatment plants.
- •Emergency essential power.
- •Sanitary latrine facilities (expedient).
- •Direct operational support functions.
- •Aircraft maintenance operational support functions.
- •Temporary ammunition storage.
- •Petroleum, oil, lubricants (POL) systems.
- •Medical treatment facilities.
- •Decontamination facilities.
- •Electrical distribution system.
- •Water distribution system.
- •Indirect operational support facilities (kitchen, dining hall, etc.).
- •Waste utility systems.
- •General billeting.
- •Camouflage, concealment, and deception.
- •Recreation.

Required Facilities

Appendix G is a matrix listing the required facilities for different base sizes (ranging from 750 to 15,000 personnel). [AFP12]

Given the size of the base being planned, each matrix row gives the function that is to be performed, the type of shelter to be used, the quantities of such shelters, and their code in the [TA158].

The codes used for type of shelter in Appendix G are shown in Figure 7, further detail will be provided in the Harvest Bare section [AFP12]:

ESC:	Expandable Shelter Container, 21' 5.2" x 13' 4" x 8' 0" when constructed.
EXP:	Expandable Personnel Shelter, 32' 0" x 13' 7" x 8' 2.5" when constructed.
GP:	General Purpose Shelter, 48' 0.25" x 31' 2.28" x 11' 9".
TEMPER:	Tent Extendible Modular Personnel, a tent supported by a modular aluminum frame structure. Built in 8' 0" x 20' 0" increments, nominally 32' 0" x 20' 0".
TFS:	Tension Fabric Structure. Many TEMPER structures will be replaced by TFSs. Various sizes.

Figure 7, Harvest Bare Shelter Codes [AFP12]

Utilities Systems

Utilities distribution plans are also included in [AFP12]. Appendix H includes Electrical Distribution System, Water System,

and Force Main-Sewage Plans for the 750 man base, [AFP12] also includes such plans for larger bases.

Construction Planning and Modular Construction

The Air Force publication, "Contingency Response Procedures, Bare Base Conceptual Planning Guide" [AFP12] does provide considerable guidance for Air Force construction forces. This manual puts considerable emphasis on the use of the modular construction assets of the Harvest Bare and Harvest Eagle systems, which will be discussed in the following section.

Extent of Modular Construction

The Air Force provides for modular construction in all phases of its contingency planning. The Air Force uses the Army Facilities Component System (AFCS), which provides for modular construction planning with pre-designed structures, some of which serve several different uses. [Wiggs90]

The Air Force has gone beyond the extent of pre-procuring construction materials and separating them into 'kits' for specific AFCS facilities, having actually procured pre-built structures

designed to meet many of their needs; so, the Air Force does plan on using a considerable amount of modularly constructed facilities outside of AFCS. The three largest Air Force modular programs are Harvest Bare, Harvest Eagle, and Harvest Falcon. [AFP12]

Harvest Eagle is an air-transportable package of equipment, spare parts and supplies required to support Air Force operations under bare base conditions. This system was designed around the use of tents, and is for a base population of up to 1,100 personnel. Harvest Eagle is not intended to be an all inclusive package that is capable of supporting sustained air operations, but it can be used as an intermediate measure until augmented by Harvest Bare facilities. [AFP12]

Harvest Falcon is similar to Harvest Bare in size, mission, and capabilities, except Harvest Falcon was designed for use only in warmer climates such as South West Asia. Like Harvest Eagle, Harvest Falcon is a tent-based system instead of a hardwall system, so it contains no freeze protection. [AFP12] Because Harvest Falcon and Harvest Eagle are only tent-based systems, only Harvest Bare will be discussed in greater detail.

Harvest Bare

Harvest Bare is a package of modular shelters, equipment, and vehicles required for base operations, personnel support, and aircraft support in bare base conditions. It's shelters are of the hardwall variety, and the entire system is air-transportable. Harvest Bare is designed to provide a wide range of logistical support to long term Air Force operations. There is one full set of Harvest Bare equipment, enough to support a base of 4,500 personnel, it is currently located inside the Continental United States (CONUS). [Wiggs90] and [AFP12]

All Harvest Bare hardwall shelters accommodate forklift tines for transportation and loading. None of the shelters offer protection against weaponry, they would have to be hardened on site to offer such protection. The following is a description of the main shelter types used in Harvest Bare. [AFP12]

Aircraft Maintenance Hangar. The Aircraft Maintenance Hangar (ACH) would be used for aircraft or vehicle maintenance, or similar functions. This is the largest structure in the Harvest Bare system, measuring 125.6' long, 77' wide, and 25 feet high at its

center; it packs into four equal size containers, each is 9' 8" x 8' 0" x 8' 0" (approximately 619 cf). A crew of 12 persons can construct one ACH in about 10 to 12 hours. [AFP12]

The ACH is made of sandwich panels, made of resin-impregnated paper honeycomb between sheets of aluminum, supported by aluminum beams. The sandwich panels are locked to the beams at ground level, forming an arch section, these sections are double-pinned together and lifted with an A-frame hoist to form an arch. Each arch is free standing, the space between the arches is covered with a fabric flashing, and the ends of the ACH are also fabric. There is no floor included in this kit; suggested floors are concrete, AM-2 matting, or other local materials. The structure is wired for 3 phase electrical power and has openings for HVAC units. [AFP12]

Expandable Shelter Container. The Expandable Shelter Container (ESC) would be used for industrial shops, flightline shops, kitchens, or restrooms. The ESC measures 21' 5.2" x 13' 4" x 8' 0" (approximately 2,286 cf) when extended, and is 8' 0" x 8' 0" x 13' 4" (approximately 853 cf) when packed. A crew of four to six persons

can erect the ESC in about two hours. [AFP12]

The ESC is made of sandwich panels (like those in the ACH), with an aluminum frame. The ESC unfolds on hinges from its packaged configuration to its final form. The shelter has nonopening windows that are shatterproof, heat resistant, and are equipped with blackout curtains. There are personnel doors on one end of the shelter, and cargo doors on the other. One of the swing-out walls has removable panels where heating or air conditioning equipment can be installed if necessary. The unit is wired for electrical service, and jacks are provided for leveling. [AFP12]

The ESC is very versatile as it can be readily converted into one of two other specialized versions, the Shower Shelter or the Toilet/Latrine Shelter.

The Shower Shelter includes eight shower heads and partitions, eight sinks with lighted mirrors, three wall-mounted coat racks, water heater, space heaters, fuel pumps, and a sump pump. It requires external utilities hook-ups, and can provide adequate facilities for approximately 280 personnel. [AFP12]

The Toilet or Latrine Shelter includes twelve toilets, four urinals, four sinks, a hand drier, water heater, space heaters, fuel pumps, and a sump pump. A few shelters have waste incinerators, but most store waste in the holding tank until removed by truck or emptied into a sewer system. The shelter requires external utilities hook-ups, and can provide facilities for approximately 280 personnel. [AFP12]

General Purpose Shelter. The General Purpose Shelter (GP) would be used as a dining hall or as a general or equipment warehouse. The structure is 48' 0.25" x 31' 2.28" x 11' 9" (approximately 17,600 cf) when constructed, and it takes up only 8' 0" x 8' 0" x 9' 9.75" (628 cf) when packed in a container. [AFP12]

The structure is assembled by first constructing self-supporting arches, each made from 6 rigid honeycomb panels and 12 I-beams. Once each arch is built, it is connected to the others with adjustable spacers. One end wall has personnel doors, the other has cargo doors. The shelter has rigid doors and windows, and has removable panels where HVAC units may be installed if required. The floor could be placed before construction, or if none is present, the kit contains an

optional fabric floor. Each side of the shelter has a distribution panel and cable arrangement to provide lighting and electrical outlets. [AFP12]

The GP kit includes all necessary construction tools. A crew of six can complete the shelter, if a floor is already present, in about 15 hours; if a floor is to be installed, it takes up to 20 hours. [AFP12]

Expandable Personnel Shelter. The Expandable Personnel Shelter (EXP) would be used for administrative offices, food preparation and storage, and air crew alert buildings. The shelter is 32' 0" x 13' 7" x 8' 2.5" (approximately 3,568 cf) when expanded, and is 13' 4" x 8' 0 " x 2' 8" (approximately 284 cf) when packed. Three EXPs are normally shipped together. A crew of 4 to 6 people can construct an EXP in about 2 hours. [AFP12]

The shelter's fixed walls, floor, and ceiling are made of the aluminum and honeycomb sandwich panels, and the expandable walls and ceiling sections are made of accordion-pleated foam board panels. The EXP is wired for electrical service, and HVAC units can be readily connected. Blackout curtains are included for all openings, and jacks are provided for leveling. [AFP12]

TEMPER Tent. The Tent Extendible Modular Personnel (TEMPER) is not a Harvest Bare hardwall shelter, but is included here because of its wide use in planning for a contingency situation. The TEMPER would be used as a general purpose structure when a hardwall shelter is not necessary or is impractical. It is a fabric structure supported by an aluminum frame, it comes in 8' x 20' sections that connect together. The normal size of a completed TEMPER is 32' x 20', this size can house twelve personnel. [AFP12]

The tent has a white inner liner for insulation, and has roll up windows, it can be heated or cooled as required, an electrical kit provides lights and duplex outlets. A crew of four can erect a TEMPER in about 2 hours. [AFP12]

CHAPTER IV

UNITED STATES ARMY

Overview of Army Contingency Construction

The Army is by far the largest participant in Armed Services contingency construction, its forces are greater than the Navy and Air Force combined. The Army is not only responsible for meeting its own construction needs, but is also responsible for meeting most of the Air Force's heavy construction needs. [AFR10 79]

The Army has five 'keys to success' for contingency construction outlined in [FM333 87]:

- SPEED, based on standardization of plans and construction methods, keeping construction as simple as possible, meeting only minimum needs, phasing construction, and maximizing use of existing facilities.
- ECONOMY of personnel, equipment, and materials.
- FLEXIBILITY with uses of structures and availability of materials.

• DECENTRALIZATION OF AUTHORITY, enabling local engineering commanders to have greater authority in accomplishing their missions.

• ESTABLISHING PRIORITIES in a clear manner, with lower echelons completing the details of particular projects' priorities.

The Army Facilities Component System (AFCS) is a comprehensive set of construction designs that support the speed, economy, and flexibility topics mentioned above. Further discussion includes details on the Army Construction Forces and AFCS. [FM333 87]

Army Construction Forces

General

The Army has two types of units that will provide for almost all of their contingency construction needs, they are the Engineer Combat Battalion and the Engineer Combat Battalion (Heavy). The Army currently has a total of 92 Engineer Combat Battalions and 48 Engineer Combat Battalion (Heavy) on active duty. Of the 92 Engineer Combat Battalions, 33 are on active duty and 59 are Army

reserve or National Guard; of the 48 Engineer Combat Battalions (Heavy), 15 are on active duty and 33 are Army reserve or National Guard. [EFD90]

Engineer Combat Battalions' duties are primarily combat engineering, their normal tasking includes placing and removing minefields, construction and placement of deceptive devices and assistance in camouflage operations, site preparation for antiaircraft units, construction of defensive positions, and river assault crossings. However, they do have a small contingency construction role in that they are able to provide limited emergency repairs to roads, runways, heliports, and structures. [FM333 87]

The Engineer Combat Heavy Battalions provide the contingency construction capability that is the focus of this paper. These Battalions have access to smaller special construction units designed to augment them when a project requires it. Engineer Combat Heavy Battalions and these special construction units will be discussed in the following sections. [FM333 87]

Engineer Battalion, Combat, Heavy

Mission. The mission of the Engineer Combat Heavy Battalion is to construct, repair, and maintain main supply routes, runways, buildings, structures, and utilities. [TOE5415 86]

Capabilities. Unit capabilities include performing all types of construction and repair on the facilities listed above, and provide repairs and limited reconstruction of railroads, water and sewage facilities. They can clear or create obstacles to mobility, perform engineer reconnaissance, prepare demolition targets, and conduct area damage clearance and restoration operations. The Battalion can also supervise contract construction, skilled construction labor, or unskilled personnel. The Battalion performs maintenance and repairs on its own construction and power generating equipment. [TOE5415 86] and [FM101-2 87]

When specialized units are attached, an Engineer Combat Heavy Battalion is capable of bituminous paving, portland concrete cement paving, quarrying and crushing operations, reconstruction of railroads and railroad bridges, repairing ports and harbors, constructing petroleum pipelines, electrical distribution work, and

major airfield repair and construction. [TOE5415 86]

Method of Operation. The Combat Heavy Battalion receives its construction tasking from higher headquarters. The Battalion Operations Officer (S3) analyzes the tasking and assigns the projects to individual Companies based on the project priority and the Companies' existing workload. The Operations Officer is to determine if there is a need for augment personnel and/or equipment to be supplied to the assigned Company, he is also to pass on any critical material needs to the Battalion Supply Officer (S4). The Company assigned to the project will make up a detailed list of materials needed and will order them through the Battalion Supply Office. The Operations Officer's earlier notice of critical materials gives the Supply Office a headstart in ordering without having to wait for the detailed Company list of materials. The Battalion Intelligence Officer (S2) provides tactical and weather information to the individual Companies. [FM116 89]

The Company Commander receives his tasking from the Battalion Operations Officer, and then organizes his company accordingly. Large projects may take the whole company, but most

can be handled by a single platoon. The Platoon Leader and Platoon Sergeant serve as the project managers. The Company Commander and Platoon Leader lead the quality control on each construction project. The Battalion Operations Officer performs quality assurance for the Battalion, inspecting the Company Quality Control system. [FM116 89]

Manning. An Engineer Combat Heavy Battalion is manned by 35 Officers and 675 Enlisted personnel; it is made up of four companies, one Headquarters and Support Company (HSC) and three Engineer or 'Line' Companies. [FM116 89]

Headquarters and Support Company

An Engineer Combat Heavy Battalion's Headquarters and Support Company (HSC) is in charge of the staff requirements of the Battalion, it also has some of the Battalion's specialty construction equipment and an equipment maintenance section. An HSC has 20 Officers and 216 Enlisted personnel. [FM116 89]

Appendix J shows the Company organization and it lists its construction assets. [FM116 89] and [TOE5416 86] An HRC has a 12.5 ton and two 25 ton cranes, pile driving equipment, concrete and

bituminous paving equipment, nine 20 ton dump trucks, and other heavy equipment. [TOE5416 86]

Engineer Company , Combat , Heavy

Each of the Engineer Combat Heavy Battalion's three Engineer Companies are manned by 5 Officers and 153 Enlisted personnel, their mission is to essentially the same as that of the Engineer Combat Heavy Battalion. These 'Line' Companies perform the bulk of the contingency construction effort, as opposed to the combat engineering effort, for the U. S. Army. [FM116 89] and [TOE5417 86]

Each Line Company has considerable construction assets, including 11 diesel powered generators, 4 front end loaders, 2 pumps (100 GPM and 210 GPM), 4 scrapers, 3 road graders, 2 rollers, 5 bulldozers, 10 dump trucks, and a 25 ton crane. Appendix K includes the Company organization and lists all equipment assigned to each 'Line' Company. [FM116 89] and [TOE5417 86] Each Company has considerable horizontal construction capability, and also has tool kits for vertical construction requirements. [TOE5417 86]

Many smaller, specialized construction units exist in the Army to augment the Combat Heavy Battalions and their Companies, some

of these are described below.

Engineer Company , Construction Support

The mission of the Engineer Construction Support Company is to provide equipment and personnel support to other engineering units for rock crushing, bituminous mixing, and paving for major horizontal construction projects such as highways, storage facilities, and airfields. [TOE5413 87] Construction projects are normally not tasked to the Engineer Construction Support Company, but to an Engineer Combat Heavy Battalion; the Support Company is assigned to augment the Battalion personnel and equipment. Each Company is manned by 5 Officers and 169 Enlisted personnel. [FM116 89]

An Engineer Construction Support Company is capable of providing operators and equipment for construction projects on a two shift operation. It can also provide up to 225 tons per hour of crushed rock and sand from rock quarries and gravel pits on a two shift operation. On a one shift operation, it can provide up to 150 tons per hour of washed and sized precrushed rock. The Company can perform maintenance on all of its construction equipment, including the power generation equipment. [TOE5413 87]

The Company possesses special equipment that normal construction units do not, including four 40 ton cranes, eleven generators (including two 100 KWs), and two pile drivers (one 7,000 pound and one 12,000 pound). They also possess a considerable amount of paving and rock crushing equipment, Appendix L details the Company Organization and lists all Company equipment. [FM116 89] and [TOE5413 87]

Engineer Company , Port Construction

The mission of the Port Construction Company is to provide specialized support in the construction, maintenance and repair of port facilities. [TOE5603 86] The 10 Officer, 196 Enlisted personnel manning a Company are capable of constructing and maintaining off shore facilities, including mooring systems, breakwaters, jetties (including Petroleum- Oil -Lubricant (POL) jetties), submarine pipelines, and tanker discharge facilities. They are also capable of constructing and maintaining wharves, piers, and ramps, and their related structures used in cargo handling. A Port Construction Company has a limited capability in dredging and in the removal of underwater obstacles, they also perform maintenance on their own

construction equipment. [FM116 89]

The Company has various cranes, boats, pile drivers, dump trucks, and concrete equipment. Appendix M includes the complete Company equipment list. [FM116 89] and [TOE5603 86]

Engineer Company, Dump Truck

The mission of an Engineer Dump Truck Company, as one would expect, is to operate dump trucks for the movement of bulk materials in support of other engineer units. [TOE5424 87] Each Company is manned by 4 Officers and 79 Enlisted personnel [FM116 89], and has 30 diesel dump trucks each with a 20 ton or 12 cubic yard capacity. The trucks operate in six sections of five trucks each.

The unit provides a 600 ton per trip haul capacity for bulk material, usually gravel, earth fill, and crushed stone. A Company will also perform unit maintenance on all of its construction equipment. [TOE5424 87]

Engineer Company, Pipeline Construction Support

The Pipeline Construction Support (PCS) Company's mission is to provide trained personnel and specialized equipment to assist other engineer units in the construction and repair of pipeline

systems. A PCS Company can provide support in pipeline construction, including pipe stringing, pipe coupling, storage tank erection, and the construction of the pump station and dispensing facility. A PCS Company can provide support for up to three Engineer Companies simultaneously. The PCS Company would provide one construction platoon of three construction squads to each Engineering Company being supported. The 6 Officer, 170 Enlisted PCS Company is capable of performing all of the above tasks on a two shift basis. They can transport the pipeline over unimproved roads, and perform maintenance on their own construction equipment. [FM116 89]

Bridge Companies

There are three types of Bridge Companies, each with a different type of bridge: Medium Girder, Panel, and Ribbon. Two of these are Engineer Companies; the Engineer Company (Medium Girder Bridge) and the Engineer Company (Panel Bridge). The third is a Bridge Company, assigned to an Engineer Battalion, Heavy Division. All three types of bridges and Companies would have use in a contingency environment. [TOE5463 88] and [TOE5148 87]

Medium Girder Bridge Company and Panel Bridge Companies. The Medium Girder Bridge Company and the Panel Bridge Company are both made up of the same organizations, each with a strength of 5 Officers and 105 Enlisted personnel. Both types of companies have the mission of transporting, assembling, and disassembling their respective bridges, and the are to provide dump trucks for earth moving and other required hauling. [TOE5463 88]

The Medium Girder Bridge Company carries four bridge sets and can assemble various spans and load classes, it can assemble single or double story bridges. It can provide four 103 foot Class 60 bridges, or two 163 foot bridges if it has the proper reinforcement kits. The Company has sufficient personnel and equipment to assemble two bridges simultaneously. The Company's five ton dump trucks allow up to 150 tons to be hauled per trip when they are not loaded with the bridge equipment and materials. [TOE5463 88]

A 103 foot Medium Girder Bridge can be built in approximately one hour, the 163 foot reinforced version requires four hours. [FM90-13 78]

The Panel Bridge Company carries one panel (Bailey) bridge set and can assemble it for various loads and spans. Without a reinforcement set, they can construct up to an 80 foot, single story bridge, Class 60 for tracked vehicles, Class 50 for wheeled vehicles. With a reinforcing kit and additional spans, the Company can construct up to a 180 foot bridge of the same capacity. The Panel Bridge Company has the same haul assets as the Medium Girder Bridge Company. [TOE5463 88]

An 80 foot Panel Bridge can be built in approximately two hours, the 180 foot reinforced version requires six hours to construct. [FM90-13 78]

Bridge Company, Ribbon. The mission of the 5 Officers and 121 Enlisted personnel of a Ribbon Bridge Company is to construct and remove floating type bridges. Once the bridge sections are offloaded, the transporters are to assist by hauling cargo across the bridge. [TOE5148 87]

The Ribbon Bridge Company can provide 476 feet of floating bridge, it also has 18 assault boats to transport 216 personnel per crossing. [TOE5148 87] Unlike the above fixed bridges, the capacity

of the floating bridge is dependent on the speed of the river current. The floating bridge is a Class 60 when the current is less than 8.2 feet per second, it is rated at a Class 45 in currents between 8.2 and 9.8 feet per second, the bridge requires reinforcement in a swifter current. A Ribbon Bridge can be constructed at an average rate of approximately 500 feet per hour. [FM90-13 78]

Engineer Support Teams

The Army also has a variety of Engineer Support Teams which may be employed to perform specialty operations. Teams specifically involved in contingency construction activities include various diving teams, a pipeline design team, a utilities team, and a power line team. [TOE5530]

Deep Water Diving Team. This one Officer, 22 Enlisted team can provide scuba, lightweight, and deep sea surface supplied diving to a maximum depth of 250 feet. They support harbor operations and are normally assigned one Team per three Port Construction Companies. Each team is capable of three simultaneous diving operations. [TOE5530]

Lightweight Diving Team. This team has one Officer and 15 Enlisted personnel, it can provide diving support to a maximum depth of 190 feet. It provides lighter duty support to harbor operations than the Deep Water Team. [TOE5530]

Scuba Diving Team. The Scuba Team is manned by seven Enlisted personnel, and can provide diving support to a maximum depth of 130 feet. It basically provides only inspection and demolition services in support of construction operations. [TOE5530]

Pipeline Design Team. A Pipeline Design Team consists of two Officers, three Enlisted Draftsmen, and one Enlisted Clerk (total of six persons). The Team's mission is to assist in the design of pipeline construction projects and to select pipeline routes and tank farm locations, they design all related structures and equipment, and can assist in the supervision of such construction operations. [TOE5530]

Utilities Team. One Utilities Team is made up of two Officers and 57 Enlisted personnel, it is capable of providing electrical distribution systems and pest control for a fixed base of up to 4,000 personnel. [TOE5530]

Power Line Team. A Power Line Team has 16 Enlisted personnel and is tasked with being able to construct and maintain up to 60 miles of high voltage electrical lines. [TOE5530]

Construction Plans and Designs

Army Facilities Component System - General

The Army's plans and designs for contingency construction are part of Army Facilities Component System (AFCS). This system is to be used by military planners to prepare logistic estimates, and by construction and supply personnel in the fulfillment of their missions. [TM304]

The need for the AFCS arose out of World War II and the Korean War, where the lack of such a system resulted in planners being unable to quickly determine the logistic needs for bases in the contingency construction area. Once the need for a particular structure was determined, the lack of pre-planned facilities meant that planners then had to go through the lists of federally stocked materials to prepare the Bill of Materials for a project. [TM304]

The AFCS began in 1951 and now includes planning guidance, detailed construction drawings, and Bills of Materials for approximately 3,000 facilities. These facilities include airfields, roads, ports, troop housing, storage facilities, administration buildings, tank farms, and almost all other areas of Army and Air Force needs. [TM304]

AFCS - Terminology and Assumptions

The AFCS uses some of the same terms as the Navy's Advanced Base Functional Components System (ABFC), unfortunately, not all the common terms have a common meaning. [NFP437 86] and [TM304]

The Navy ABFC system has a three tier structure; 'components' are the largest, they are made up of 'facilities', which are made up of 'assemblies'. The Army AFCS has a two tier structure; 'installations' are the largest (equivalent to the Navy 'component'), they are made up of 'facilities' (equivalent to the Navy "facility'). [NFP437 86] and [TM304]

The AFCS considers an 'installation' to be a group of facilities that provide a specific service or support a specific military function.

Each installation is identified by an installation number, with two alphabetic and four numeric characters, an example would be AA1041, which is one of several variations of Administration Offices. [TM301 86]

The AFCS defines a 'facility' as a group of items that provide a specific service, or it may be a piece of equipment that enhances the function of a structure. Several facilities may be required to have a complete and usable final product. The Facility Number is seven digits; five are numeric, followed by two alphabetic. An example is Facility Number 87210AA, a 100 LF length of Chain Link Fence, with two outriggers. [TM304]

An 'Item' is used in AFCS to mean any single piece of material or equipment that has a National Stock Number (NSN). Examples are wire, plywood, nails, etc. [TM304]

A 'Component' is used in the AFCS as a generic term, it could refer to either a facility or an installation. [TM301 86]

AFCS is designed for use in any location in the world, to take climate into account, the world is divided into four 'climatic zones'. These zones are Temperate, Frigid, Tropical, and Desert. The

Temperate Zone includes areas with a mean annual temperature between +30°F and +70°F. Frigid Zones are defined as having mean annual temperatures below the Temperate Zones' range; Tropical Zones, above. Desert Zones are arid locations void of vegetation. [TM301 86] Estimates for construction man-hours are based on requirements for the Temperate Zone, the estimates for the other zones were made by multiplying the temperate man-hour requirement by the adjustment factors in Table 1 [TM304]:

Frigid	2.41
Tropical	1.45
Desert	1.25

Table 1, AFCS Climate Adjustment Factors [TM304]

The Construction Standards used in the AFCS are the same used in the Navy ABFC system, since they are both set by [JCS3]. The standards are based on the expected duration of the contingency, and so determine the expected need of the facilities. "Initial" is used for up to 6 months, "temporary" is used for 6 to 24 months. Most of the

AFCS facilities are in the temporary range, and with the life of the facilities should be able to exceed five years if proper maintenance is performed. [FM101-1 87]

The AFCS breaks building structures into three types, as shown in Figure 8 [TM301 86]:

Disposable	Building is formed on site, it has little or no recovery value. i.e. Woodframe, concrete block, etc.
Pre-engineered Relocatable	Structures that have at least an 85% recoverability, i.e. Panelized buildings, etc.
Mobile	Containerized buildings or those that can be easily moved and rebuilt frequently, with little construction effort.

Figure 8, AFCS Building Structure Types [TM301 86]

"Few mobile facilities other than tents are presently contained in AFCS; however, priority for future designs has been given to the initial mobile-type facilities where feasible." [TM301]

Bills of Material in AFCS include an additional percentage added to each line item for waste and loss, this percentage varies for different materials, ranging from 0 to 20%. [TM304]

AFCS -Manuals

The AFCS consists of a series of four Army technical manuals, [TM301 86] through [TM304]. A short description of each will be given in this section, and a more detailed description of how these manuals work together is in the following section.

The [TM301 86] is a summary of all installations and facilities; each summary includes the cost, material shipping volume and weight, and estimated construction effort in man-hours. The [TM301 86] is used primarily by planners and construction personnel at all levels. There are four separate volumes of this manual, one for each of the climatic zones. [FM101-1 87]

The [TM302 86] contains the construction drawings to be used in the field. These drawings are to be used by the actual construction forces, but would also be useful to those planning the advanced base, especially when determining base layout. [FM101-1 87]

The [TM303 86] contains the Bills of Materials for each of the installations and facilities. It breaks down the requirements into individual items, each of which is identified by name and by National Stock Number (NSN).

The [TM304] is the 'User's Guide' to AFCS. It explains how to use the system and provides necessary reference information (i.e. a map of the world showing AFCS climatic zones).

AFCS -Design Example

If administration spaces need to be constructed at an advanced base, planners would first refer to the Climate Zone chart in [TM304]. If the chart showed the location in the Temperate Zone, the planner would refer to [TM301 86] Temperate, to find the appropriate Installation. As there are several Administration Installations, the planner would have to pick from among them based on the Construction Standard and by the size of the administration space needed. For this example, assume the Base will be used for more than six months but less than two years, so the Construction Standard will be Temporary. Also assume that the office space will be for between 100 and 150 personnel. With this information, the

planner would select Installation Number AA1041 from among the other Administration Installations. the following page is Figure 9, the page from [TM301 86] describing this Installation.

DDEXER1 TM5-301 RUN DATE 860207 PAGE 4

TEMPERATE CLIMATE

ADMINISTRATION,10,000 SF TEMPERATE CLIMATE,TRANSITIONAL TEMP AA1041
STD. DWG AA 1011 - 1121, WOOD BLDGS. PROVIDES OFFICE OR
TECHNICAL SPACE FOR 125 PERSONNEL, CONCRETE FLOORS IN ADMIN.
BLDG. 4 INCH. STOREHOUSE 4 INCH, SHOP 6 INCH. WATER BORNE
SEWAGE. REQUIRES, 3.[illegible] ACRES, 218 CY FINE AGGREGATE, 335 CY,
COARSE AGGREGATE, 1250 GALLONS PER DAY WATER, 875 GALLONS
PER DAY SEWERAGE, POWER 12.6 KW CONNECTED LOAD

FAC NUMBER	FACILITY DESCRIPTION	SIZE OR UNIT	BASIS	QUANTITY REQUIRED	MATERIALS WT-ST	MATERIALS VOL-MT	MATERIALS COST	CONSTR EFFORT IN MANHOURS HORZ	CONSTR EFFORT IN MANHOURS VERT	CONSTR EFFORT IN MANHOURS GENL	CONSTR EFFORT IN MANHOURS TOT
21410GP	3600 SQ.FT. BUILDING GP WOOD		1PER INST	1.0	1018	926	87942	370	2977	962	4309
44110SE	STOREHOUSE WD FR BLDG 20X20X8	20X20X8FT	3 SF/ MAN.	1.0	10	11	1943	23	262	53	338
61050BT	ADMIN HQ BLDG WD FR 10M SF X 8 FT	10000SF	80SFMAN,GROSS	1.0	49	73	16330	175	4489	846	5510
61050BW	ADMIN SUP BLDG,WD FR,30FTX70FTX8FT		80SFMAN,GROSS	4.0	188	216	35792	200	3700	760	4660
72321BB	LATRINE,PIT TYPE,2 SEATS,4X5X8,WOOD	5X4X8FT	160EM/80 OFFR	2.0	2	2	188		80	16	96
81240BK	ELEC DISTR ADMIN 10000SF TRANS+TEMP	10000SF	LIGHT / POWER	1.0	2	2	1207	48	524	16	588
83111BC	DRAINAGE FOR 10M SF ADMINISTRATION	10000SF	7 GPD/MAN	1.0	2	2	1091	48	304	48	400
84210DF	WATER DIST/10000SF ADMIN TEMPORARY	10000SF	10 GPD/ MAN	1.0	3	1	2073	73	256	64	393
84330AC	SUMP FIRE PROTECTION 10000 GAL	10000 GAL	EFF RD 500 FT	1.0	7	5	145	16	108	116	240
87190AA	SITE PREPARATION,ONE ACRE		AS REQUIRED	3.6				317		115	432
					1281	1238	146711	1270	12700	2996	16966

Figure 9, Installation AA1041 from [TM301 86]

Figure 9 includes a description Installation Number AA1041, it provides 10,000 square feet of administration space for a temperate climate and temporary standard, enough space for 125 personnel. The description goes on to provide the type of floor and its thickness, including the amount of aggregate needed for construction. It also provides the required acreage, water, electric, and sewage service needs. [TM301 86]

Figure 9 then lists the facilities included in the installation; the Facility Number, description, size, and quantity. The "BASIS" column shows the criteria on which the planning was based, this is important to include because a planner would compare this to any specific information he has on the new installation, and could make changes based on differences in criteria. Figure 9 goes on to provide the material weight (in Short Tons - 2,000 pounds), volume (in Measured tons - 40 cubic feet), and cost. The construction effort is then given in man-hours, this is broken down into horizontal, vertical, and general (non-skill) categories. Installation totals are also given. [TM301 86]

The next step in this example would be to examine each of facilities to ensure that the planner's needs will be met, [TM301 86] lists all facilities. In the interest of space, only one facility will be checked, Facility Number 61050BT, the Headquarters Building. Figure 10 is the page from [TM301 86] that lists this facility; it provides information including a more complete description of the facility, but more importantly, it lets the planner see what other facilities are similar to it. The planner can check to see if another facility would be better suited for the task and could make a substitution. [TM301 86]

TEMPERATE CLIMATE

FACILITY NUMBER	DESCRIPTION	CONSTRUCTION MATERIAL WT SHT TONS	CONSTRUCTION MATERIAL VOL MEAS TONS	COST $	CONST EFFORT IN MAN-HOURS HOR	VERT	GENL	TOT
61050BM	ADMINISTRATION BLDG,WOOD FRAME W/INTERIOR, 40X100X8,W/SUPPLY ROOM,TEMP CLIM	87	100	19,315	56	2,170	283	2,509
61050BN	HEADQUARTERS & UNIT SUPPLY BLDG,COMPANY, WOOD FRAME W/INTERIOR,20X40X8,TEMP CLIM	19	25	4,628	28	431	80	539
61050BP	HEADQUARTERS & UNIT SUPPLY BLDG,BATTALION, WOOD FRAME W/INTERIOR,20X100X8,TEMP CLIM	44	60	11,736	65	1,269	270	1,604
61050BR	ADMINISTRATION,HEADQUARTERS BLDG,30FTX70FTX8FT,WOOD FRAME W/INTERIOR,USED IN 5000SF INSTALLATION,TEMP CLIM.	49	69	15,432	105	2,225	470	2,800
61050BT	ADMINISTRATION,HEADQUARTERS BLDG,30FTX70FTX8FT,WOOD FRAME W/INTERIOR,USED IN 10000SF INSTALLATION,TEMP CLIM.	49	73	16,330	175	4,489	846	5,510
61050BU	INTERIOR FOR ADMINISTRATION SUPPORT BUILDING 30X70X8 FEET USED IN THE 10000 SQUARE FOOT INSTALLATION.	2	4	2,242		540		540
61050BV	INTERIOR FOR ADMINISTRATION SUPPORT BUILDING 30X50X8 FEET. USED IN THE 5000 SQUARE FOOT INSTALLATION.	2	3	1,691		384		384
61050BW	ADMINISTRATION,SUPPORT BLDG,30FTX70FTX8FT,WOOD FRAME W/INTERIOR,USED IN 10000SF INSTALLATION,TEMP CLIM.	47	54	8,948	50	925	190	1,165
61050BY	ADMINISTRATION,SUPPORT BLDG,30FTX50FTX8FT,WOOD FRAME W/INTERIOR,USED IN 5000SF INSTALLATION,TEMP CLIM.	35	39	6,549	35	800	140	975
61050CA	ADMINISTRATION,SUPPORT BUILDING 30X70X8 FEET STEEL FRAME WITH INTERIOR. USED IN THE 10000SF INSTALLATION TEMP.CLIM.	16	32	24,359	50	850	180	1,080
61050CB	ADMINISTRATION,SUPPORT BUILDING 30X50X8 FEET STEEL FRAME WITH INTERIOR. USED IN THE 5000SF INSTALLATION TEMP.CLIM.	12	23	15,740	35	700	130	865
61050DA	ADMINISTRATION BUILDING, LIGHTWEIGHT STEEL PANEL WITH INTERIOR 20 BY 30 BY 8, WITH SUPPLY ROOM, TEMP CLIM	3	4	1,345	6	212	50	268
61050DB	HEADQUARTERS AND UNIT SUPPLY BUILDING COMPANY, LIGHTWEIGHT STEEL PANEL BUILDING WITH INTERIOR, 20 BY 40 BY 8M TEMP CLIM	4	5	1,367	7	205	63	275

Figure 10, Facility 61050BT from [TM301 86].

The Bill of Materials and the Construction Drawings are the next items to review. The [TM303 86] lists Bills of Materials, Appendix N includes the Bill of Materials for Facility Number 61050BT, the Headquarters Building. The first page of Appendix N lists three 'subfacilities' that make up the Headquarters Building, one of these is 61050BB, "Interior for Administration, Headquarters." The second and third pages of Appendix N list the items that make up Facility 61050BB, the building interior. The list includes all the materials needed to build the facility, from nails to electrical wire. [TM303 86]

The AFCS construction drawings are in [TM302 86], Appendix P includes drawings for Facility 61050BT, the Headquarters Building. This drawing includes the building floor plan and has a drawing schedule which references other drawings that provide additional information on wood frame construction and appropriate details. The original drawings are in 1/8"=1', but are half size in the [TM302 86].

Extent of Modular Construction

The Army provides for modular construction in its contingency planning up to and including the design phase. The AFCS provides for modular type planning with pre-designed structures, some of which have several different uses.

The Army has not gone to the extent of pre-procuring construction materials and separating them into 'kits' for specific AFCS facilities. Instead, their plans in a contingency situation are to procure construction materials in bulk quantities, and to ship them to a supply unit near the construction. Engineer units would draw the materials from bulk quantities; for example, they would order 300 sheets of plywood, 600-2x4x8's, etc. instead of ordering one Facility Number 12345AB. [Steinman90]

The Army has not procured pre-built structures (similar to Air Force Harvest Bare) for many of their needs, the exception to this is the Deployable Medical Systems (DEPMEDS). DEPMEDS is a Joint Service modular field hospital system described below. [Steinman90] and [DMSUM89]

CHAPTER V

JOINT SERVICES

MODULAR MILITARY CONTINGENCY HOSPITALS

In May 1981, the Military Field Medical Systems Standardization Steering Group (MFMSSSG) was established to bring forth a system of depoyable hospitals that could be standardized by all branches of the U. S. Armed Services. The Congress spurred this spirit of cooperationby disapproving all funds for all military branches' field type hospitals because of the lack of commonality. Although common to all branches of the service, the Army is procuring the bulk of the field units, which they call "DEPMEDS", for Deployable Medical Systems. [DMSUM89] Appendix Q lists the types of hospitals the Army plans on fielding, the quantity of each, the fielding schedule, and a chart showing the types of units that will be receiving them. [DMSFS87]

The Army plans on purchasing 156 DEPMEDS hospitals in the following seven different sizes and configurations [FC71 81]:

- Evacuation Hospital (EVAC), 76,131 cubic feet (cf), 383.7 tons.
- Mobile Army Surgical Hospital (MASH), 41,154 cf, 220 tons.
- Combat Support Hospital (CSH), 57,652 cf, 252.5 tons.
- 300 bed Station Hospital (STA 300), 49,237 cf, 201.1 tons.
- 500 bed Station Hospital (STA 500), 71,016 cf, 346.3 tons.
- Field Hospital (FIELD), 94,981 cf, 430 tons.
- General Hospital (GEN), 128,717 cf, 710.8 tons.

Appendix Q also includes a matrix that details the capabilities of each of the above hospitals. [FC71 81]

The International Standardization Organization (ISO) container is the world standard in shipping, the most common two sizes are the 8' x 8' x 20' and the 8' x 8' x 40' containers. The DEPMEDS is based on the 8' x' 8' x 20' ISO container, and the hospitals sets are packaged and prestagged throughout the world, other sets are with military units for training purposes. [DMSUM89]

The standard ISO container has led to one of the most important developements in contingency modular construction, the

ISO shelter, expandable or non-expandable. The two main modular structures used in DEPMEDS are the TEMPER (described in the Air Force section) and the ISO Shelter. The simplest example of an ISO shelter is the non-expandable type, it is 8' x 8' x 20' ISO container with a personnel door on one end, double doors on the other end. The interior can be built for any special purpose or it can be left in simple standard configuration. The shelter is transported and handled as a standard ISO container. [AFP 93-12]

The DEPMEDS uses expandable ISO containers, there is the one-side expandable (2:1), and the two-side expandable (3:1). The 2:1 Shelter is 16' x 20', and is 8' high, they are used for X-ray, pharmacies, and central material service. The 3:1 shelters are 24' x 20', and are 8' high, they are used for operating rooms, general laboratories, blood banks, and medical maintenance facilities. Appendix R includes six figures showing the step-by-step method for expanding an ISO shelter. One important feature with ISO shelters is that they can be shipped with specialized equipment inside, and the equipment does not need to be removed when expanding the shelter, so the shelter can be made operational in very little time. A crew of

four is required to expand an ISO shelter in less than an hour (six persons are required in high winds). All ISO shelters have leveling jacks, leveling indicators, steps, power entry panels, exterior light fittings, and their required assembly tools in toolboxes. [DMSUM89]

The standard DEPMEDS requires that electrical, water, and sewage utilities be supplied. Engineering units are used for site preparation, site layout, construction of roads, and provision of utilities. An important difference between the services in DEPMEDS is that the Navy version, called "Fleet Hospital", includes additional equipment and material that the Army and Air Force would supply by other means. Fleet Hospital packages include 65 pieces of CESE (vehicles and construction equipment) used to construct and operate the hospital, they also include water and sewage systems. [Harrington90]

CHAPTER VI

SUMMARY

Construction Forces

The Naval Mobile Construction Battalion, the Air Force Red Horse Squadron, and the Army Combat Heavy Engineer Battalion share approximately equivalent roles for their respective services. These units are all have the training, equipment, and strength required for heavy construction. The Navy and Army are responsible for construction projects as large as the construction of an advanced base, it can be seen in Table 2 that their unit sizes are similar. The similarity of their responsibilities is reflected in their percentage of forces on active duty, almost the same, at just under one third; this indicates similar strategies of deployment and use of their construction forces. The percentage of a type of force on active duty shows how early those forces will be needed in a contingency, higher percentages usually mean heavy early involvement.

Army Combat Heavy Engineer Battalions have a much lower number of Enlisted per Officer than do Naval Mobile Construction Battalions (NMCB). This difference has consequences in the operations of these Battalions as an NMCB Company does not operate as independently as an Army Engineer Company. One of the reasons for this may be that there is usually only one Officer per NMCB Company and five Officers per Army Company. This may provide an advantage to the Army when there are a large number of construction projects assigned to a Company, or if the projects are spread out over a large geographic area.

	NMCB	RH Sqdrn	Army Combat Heavy Batt
Total Number of Units	25	6	48
Units on Active Duty	8	3	15
Units, Reserve	17	3	33
Percent Active Duty	32	50	31
Manning per unit, wartime	769	404	710
Officers	24	17	35
Enlisted	745	387	675
Enlisted per Officer	31	23	19
Total strength	19,225	2,424	34,080

Table 2, Armed Services Heavy Construction Units

The Air Force is not responsible for advanced base construction, but is responsible for emergency repairs and force beddown. The Red Horse Squadrons are smaller than their Navy and Army counterparts because of this reduced mission. The Air Force's somewhat higher percentage of forces on active duty reflects the Red Horse mission of repairing airfield damage, which would be expected to start in the earliest stages of a contingency.

All three Services have specialized units to augment their construction capabilities. The Navy has Amphibious Construction Battalions and Underwater Construction Teams, the Air Force has Prime Beef Squadrons for damage repair and force beddown. The Army has the largest variety of specialized units, providing broader capabilities than the other Services. The Army's Construction Support Companies augment construction units by providing very heavy equipment; Port Construction and Pipeline Construction units provide specialty services and equipment. The Army also has specialized Utilities Units and a full range of Diving Teams.

The Army construction program is the largest and the most diverse in terms of capabilities, it also appears to be the best structured.

Construction Plans and Designs

The two primary construction plans and designs systems, the Navy's Advanced Base Functional Components System (ABFC) and the Army Facilities Component System (AFCS), used by the Army and the Air Force. Both systems are to be used by military planners, construction forces, and supply personnel. These systems provide similar information on similar structures: each provides designs of structures, half size drawings, lists of all materials required by National Stock Number (NSN), shipping weight and volume, and estimated construction effort.

There are several differences between the ABFC system and AFCS. The system format is one such difference, the Navy ABFC system has a three tier structure; 'components' are the largest, they are made up of 'facilities', which are made up of 'assemblies'. The Army AFCS has a two tier structure; 'installations' that are made up of 'facilities'. There are also several differences in terminology.

The ABFC system and AFCS appear to be equally complete and easy to use, both systems fulfill their intended roles.

Extent of Modular Construction

The Deployable Medical Systems (DEPMEDS) or Fleet Hospital program is an outstanding example of modular construction in contingency operations. DEPMEDS is a joint service system, which means that the Navy, Air Force, and Army are all participating. Outside of joint operations, the Armed Services are not at the same level of modularity in plans for contingency construction.

The Air Force has incorporated the greatest amount of modularity into its planning. The Harvest Bare system is an air -transportable package of modular hardwall shelters, equipment, and vehicles required for base operations, and personnel and aircraft support in bare base conditions. It is designed to provide a wide range of logistical support for long term Air Force operations.

The Navy has incorporated modular concepts to a lesser extent than the Air Force, but to a greater extent than the Army. The Navy pontoon system is highly modular and is well suited for its mission. The Navy ABFC system is a modular construction plans and design system.

The Army has incorporated modular concepts up to and including its construction plans and design system, the AFCS. The Army has not gone to the extent of pre-procuring construction materials and separating them into 'kits' for specific AFCS facilities. Instead, their plans in a contingency situation are to procure construction materials in bulk quantities, and to ship them to a supply unit near the construction, where they will be drawn by construction forces as needed.

CHAPTER VII

CONCLUSION

Construction Forces

The Navy should examine increasing the Officer strength in Naval Mobile Construction Battalions (NMCBs) until their Enlisted per Officer Ratio is similar to the Army Combat Heavy Engineer Battalions' and Air Force Red Horse Squadrons'.

The Navy as a whole as a higher Enlisted per Officer Ratio than either the Army or the Air Force. The Navy philosophy could be based on standard Naval forces (ships and submarines), where the Officers and Enlisted are in close proximity. This philosophy may not be applicable to land forces, such as NMCBs, when tasked with multiple construction projects over a large geographic area.

Construction Plans and Designs

The need for separate Army and Navy construction plans and design systems should be reevaluated. The Navy's Advanced Base Functional Components System (ABFC) and the Army Facilities Component System (AFCS) appear to be redundant as so many of the components, installations, or facilities (depending on whose terminology you use) are similar in design or have similar missions in both systems. The informations that each system provides for a facility is also similar, they each list the required construction materials, shipping weight and volume, estimated construction effort, costs, and include design drawings.

Many efficiencies would be gained if the ABFC system and the AFCS were combined. Maximizing standardization of Department of Defense construction plans and design systems would provide the following benefits:

- Duplication of effort would be reduced in the management, upkeep, and updating of the construction plans and designs.
- The supply operations of ordering, purchasing, shipping, and storing construction materials would be standardized between the services.

• Modularly constructed facilities would be easier to justify as their potential benefits would increase with the number of potential users. The same benefits would apply to prepurchasing construction materials for facilities and storing them in 'kits'.

• In contingency construction operations, there could be greater flexibility in the use of construction forces. For example, Army forces could work on a Navy project if the need arose; had the materials been ordered under the Navy supply system, the Army unit would have the plans and the training, with that design, to know how to construct the facility.

Extent of Modular Construction

The Armed Forces should maximize the extent to which they include modular concepts in their contingency construction plans. The Fleet Hospital or Deployable Medical Systems (DEPMEDS) is a good example of what can be realized through modularity. An important factor in the success of DEPMEDS is the high degree of standardization between the services and the use of International Standardization Organization (ISO) containers and shelters for

shipping, handling, and storage standards. I feel that the benefits of modularity would best be realized in joint planning between the Armed Services.

CHAPTER VIII

FUTURE RESEARCH

There are many contingency construction topics that warrant future research, the following is a list of the some of those topics:

- Evaluate the use of expert systems for contingency construction forces. An example of such a system would be one that would replace and Air Force ES-1 team, they provide expert assistance on the repair and troubleshooting of electrical distribution systems and generators.
- Investigate combining the Navy ABFC system and the Army AFCS.
- Evaluate the structure of Armed Services heavy construction units with regard to Officer/Enlisted ratios.
- Investigate the use of ISO containers for Armed Services construction operations and evaluate potential uses.
- Evaluate the construction equipment used by each of the Armed Services with regard to standardization, also make comparisons to

current state-of-the-art technology. Investigate if commercially available equipment exists that can be used with a minimum of modification, aiding in purchase and resale.

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APPENDIX A

APPENDIX A

APPENDIX A

j. Selected Items of Equipment.

Equipment Code	Nomenclature/Description	Quantity
0307-31	Truck, 3/4 ton, Utility	12
0360-31	Truck, 1-1/4 ton, Cargo	16
0361-31	Ambulance	2
0643-01	Truck, 15 ton, Stake	20
0644-02	Truck, 15 ton, Dump	16
0645-12	Truck, 15 ton, Tractor	5
0645-21	Truck, 20 ton, Tractor	4
0709-21	Truck, Field Service	2
0722-31	Truck, Maintenance, Utility	4
0730-21	Truck, Wrecker, 25 ton	2
0746-21	Truck, Tank, Fuel	4

0825-11	Semi-trailer, 35 ton, Low-bed	13
0829-02	Dolly Trailer, Converter	5
0842-01	Trailer, 13 ton	1
0880-02	Trailer, Tank, 400 gal	4
1820-04	Forklift, Military 4000 lbs	5
1820-12	Truck, Forklift, 12000 lbs.,Rough Terrain	3
2433-01	Mixer, Concrete	2
2520-12	Distributor, Asphalt	1
2521-05	Distributor, Water	6
3135-02	Compressor, 250 CFM	4
3165-02	Compressor, 750 CFM	1
3165-11	Compressor, 750 CFM	1
3630-32	Hammer, Pile	1
3635-01	Extractor, Pile	1
3710-02	Auger, Earth	2
3720-02	Drill, Well, 1500 ft	1
4310-01	Ditching Machine	1
4310-02	Ditching Machine	1
4350-01	Excavator, Multipurpose	2
4420-01	Grader, Motorized	6
4530-31	Loader, Front, Truck	4
4531-09	Loader, Scoop, Wheeled	3
4531-33	Loader, Scoop, Wheeled	3
4615-01	Roller, Motorized	2
4635-23	Roller, Vibratory	3
4750-03	Scraper-Tractor	8
4830-06	Tractor, Crawler, 105 HP	2
4850-12	Tractor, Crawler, 195 HP	3
4850-22	Tractor, Crawler, 195 HP	3
4875-02	Tractor, Wheeled	2
5110-22	Floodlight, Trailer	10
5121-11	Generator, 15KW, Skid	4
5121-21	Generator, 10KW, Skid	2
5122-11	Generator, 30KW, Skid	4
5128-01	Generator, 200KW, Skid	2
5160-01	Lubricator, Powered	2
5170-71	Welder, Arc/TIG	7
5210-11	Pump, Reciprocating, 100 GPM	2
5220-19	Pump, Centrifugal	1
5220-21	Pump, Centrifugal	4
5220-31	Pump, Centrifugal	1
5250-10	Sixcon, Pump, POL	6
5250-11	Tank, Sixcon, POL	26
5250-20	Sixcon, Pump, Water	3
5250-21	Tank, Sixcon, Water	10
5420-01	Decontamination Apparatus, 500 gal	2
5490-01	Refrigeration Box, 8x8x20 ft	2
5498-03	Field Laundry	2
5710-21	Sweeper, Magnetic, Towed	2
5900-01	Saw, Woodwork, Trailer	4
5910-11	Shop, Machine, Trailer	1
8215-01	Crane, Truck, 35 ton	2
8254-25	Crane, Wheeled, 12 ton	2

APPENDIX B

f. Selected Items of Equipment.

Equipment Code	Nomenclature/Description	Quantity
0307-31	Truck, 3/4 ton, Utility	1
0360-31	Truck, 1-1/4 ton, Cargo	1
0643-01	Truck, 15 ton, Stake	2
0644-02	Truck, 15 ton, Dump	2
0645-12	Truck, 15 ton, Tractor	1
0722-31	Truck, Maintenance, Utility	1
0825-11	Semi-trailer, 35 ton, Low-bed	2
0880-02	Trailer, Tank, 400 gallon	2
1820-12	Truck, Forklift, 12K lbs, Rough Terrain	2
2433-01	Mixer, Concrete	1
2521-05	Distributor, Water	1
3135-02	Compressor, 250 CFM	1
4420-01	Grader, Motorized	1
4531-09	Loader, Scoop, Wheeled	1
4635-23	Roller, Vibratory	1
4830-06	Tractor, Crawler, 105HP	1
4875-02	Tractor, Wheeled	1
5110-22	Floodlight, Trailer	4
5121-11	Generator, 15KW, Skid-mounted	2
5122-11	Generator, 30KW, Skid-mounted	2
5170-71	Welder, Arc/TIG	2
5210-11	Pump, Reciprocating, 100 gallons	1
5250-10	Sixcon, Pump, POL	1
5250-11	Tank, Sixcon, POL	5
5250-20	Sixcon, Pump, Water	1
5250-21	Tank, Sixcon, Water	2

APPENDIX C

RED HORSE MANNING GUIDE

DESCRIPTION	AFSC	GRADE	NUMBER REQ'D
CE Staff Officer	A5516	Col	1
CE Staff Officer	5516	Lt Col	1
CE Staff Officer	5516	Maj	1
General Engineer	5525G	Maj	1
Architect/Arch Engineer	5525A	Lt	1
Civil Engineer	5525C	Capt	2
Civil Engineer	5525C	Lt	2
Electrical Engineer	5525E	Capt	1
Electrical Engineer	5525E	Lt	1
Mechanical Engineer	5525F	Capt	1
General Engineer*	5525G	Capt	2
Log Plans & Prog Off	6616	Maj	1
Exec Support Officer	7024	Capt	1
Family Physician**	9346	Capt	1
First Sergeant	10090	SMS	1
Administration Techn	70270	MSGT	1
Administration Spec	70250C	SSG	1
Administration Spec	70250C	SGT	1
Training Techn	75172	TSG	1
Training Spec	75132	SGT	1
Admin Techn	70270	TSG	1
Admin Spec	70250B	SSG	1
Admin Spec	70250B	SGT	2
Apr Admin Spec	70230B	A1C	3
Safety Techn	24170	TSG	1
Disaster Prep Tech**	24270	MSG	1
Machine Shop Techn	42770	TSG	1
Machine Shop Spec	42750	SSG	1
Medical Serv Tech IDT***	90270	MSG	1
Medical Serv Tech IDT***	90270	TSG	1
Vehicle Maint Manager	47200	CMS	1
Spec & Base Veh Equip Supv	47271	MSG	2
Spec & Base Veh Equip Supv	47271	TSG	4
Gen Purp Veh & Body Maint Supv	47275	TSG	1
Veh Maint Cont & Anal Tech	47274	MSG	1
Veh Maint Cont & Anal Spec	47234	SGT	2
Base Vehicle Equip Mech	47250	SSG	8
Base Vehicle Equip Mech	47250	SGT	9
Apr Base Vehicle Equip Mech	47230	A1C	4
Gen Purp Vehicle Mech	47252	SSG	1
Gen Purp Vehicle Mech	47252	SGT	2
Apr Gen Purp Veh Mech	47232	A1C	1
Vehicle Body Mech	47253	SSG	2
Electrical Supt	54299	SMS	1
Electrical Techn	54270	MSG	1
Electrical Techn	54270	TSG	3
Electrician	54250	SSG	4
Electrician	54250	SGT	4
Apr Electrician	54230	A1C	4
Elec Pwr Line Tech	54271	MSG	1
Elec Pwr Line Tech	54271	TSG	2
Elec Pwr Line Spec	54251	SSG	3
Apr Elec Pwr Line Spec	54231	A1C	4
Elec Pwr Pdn Techn	54272	MSG	1

DESCRIPTION	AFSC	GRADE	NUMBER REQ'D
Elec Pwr Pdn Techn	54272	TSG	1
Elec Pwr Spec	54252	SSG	2
Elec Pwr Pdn Spec	54252	SGT	3
Apr Elec Pwr Pdn Spec	54232	A1C	1
Mechanical Supt	54599	SMS	1
Refr & Cryo Tech	54570	MSG	1
Refr & Cryo Spec	54550	SSG	1
Refr & Cryo Spec	54550	SGT	1
Apr Refr & Cryo Spec	54530	A1C	1
Liq Fuels Sys Maint Tech**	54571	TSG	1
Liq Fuels Sys Maint Spec**	54551	SSG	1
Heat Sys Tech	54572	TSG	1
Heat Sys Spec	54552	SSG	1
Heat Sys Spec	54552	SGT	1
Apr Heat Sys Spec	54532	A1C	1
Pave & Const Equip Mgr	55100	CMS	1
Pave & Const Equip Supt	55199	SMS	3
Pavements Maint Techn	55170	MSG	1
Pavements Maint Techn	55170	TSG	4
Pavements Maint Spec	55150	SSG	8
Pavements Maint Spec	55150	SGT	12
Apr Pave Maint Spec	55130	A1C	11
Const Equip Techn	55171	MSG	3
Const Equip Techn	55171	TSG	6
Const Equip Opr	55151	SSG	30
Const Equip Opr	55151	SGT	29
Apr Const Equip Opr	55131	A1C	18
Structural Manager	55200	CMS	1
Structural Supt	55299	SMS	2
Structural Tech	55273	MSG	3
Structural Tech	55273	TSG	5
Masonry Spec	55251	SSG	4
Masonry Spec	55251	SGT	5
Apr Masonry Spec	55231	A1C	2
Carpentry Spec	55250	SSG	8
Carpentry Spec	55250	SGT	22
Apr Carpentry Spec	55230	A1C	16
Metal Fab Tech	55272	TSG	1
Metal Fab Spec	55252	SSG	4
Metal Fab Spec	55252	SGT	5
Apr Metal Fab Spec	55232	A1C	4
Plumbing Tech	55275	MSG	1
Plumbing Tech	55275	TSG	1
Plumbing Spec	55255	SSG	4
Plumbing Spec	55255	SGT	7
Apr Plumbing Spec	55235	A1C	4
Engineering Asst Supt	55300	CMS	1
Engineering Asst Tech	55370	MSG	2
Engineering Asst Tech	55370	TSG	2
Engineering Asst Spec	55350	SSG	4
Engineering Asst Spec	55350	SGT	3
Apr Engineering Asst Spec	55330	A1C	1

DESCRIPTION	AFSC	GRADE	NUMBER REQ'D
Production Control Supt	55590	SMS	1
Production Control Tech	55570	TSG	2
★Production Control Spec	55550	SSG	2

DESCRIPTION	AFSC	GRADE	NUMBER REQ'D
Production Control Spec	55530	SGT	1
Entomology Spec	56650	SSG	1
Enviro Supt Tech	56671	MSG	1
Enviro Supt Spec	56651	SSG	1
Enviro Supt Spec	56651	SGT	1
Apr Enviro Supt Spec	56631	A1C	1
Vehicle Operations Supv	60370	TSG	1
Logistics Plans Tech	66170	MSG	2
Financial Mgmt Supv	67273	MSG	1
Financial Mgmt Spec	67251	SGT	1
Food Service Supv	62270	MSG	1
Food Service Supv	62270	TSG	1
Food Service Spec	66250	SSG	4
Food Service Spec	62250	SGT	5
Apr Food Service Spec	62230	A1C	4
Services Spec	61150	SSGT	1
Supply Manager	64500	CMS	1
Inventory Mgmt Supv	64570	MSG	1
Inventory Mgmt Spec	64550	SSG	2
Inventory Mgmt Spec	64550	SGT	3
Apr Inv Mgmt Spec	64530	A1C	2
Mat Facilities Supv	64571	TSG	1
Mat Facilities Spec	64551	SSG	1
Mat Facilities Spec	64551	SGT	2
Apr Mat Fac Spec	64531	A1C	1

*One 6054 Transportation Officer may be substituted for one 5525G
**UTC Deployment Augmentee
***Medical Personnel must be Independent Duty Technicians
NOTE: For Air Reserve Forces, Captain is the minimum required officer grade.

RED HORSE MOBILITY ECHELON MANNING

AFSC DESCRIPTION	AFSC	GRADE	RH–1	RH–2	RH–3	TOTAL
Civil Engr Staff Off	A5516	06	—	—	1	1
Civil Engr Staff Off	5516	05	—	1	—	1
*Civil Engr Staff Off	5516	04	1	—	—	1
*General Engineer	5525G	04	—	1	—	1
Architect/Arch Engineer	5521A	02	—	—	1	1
Civil Engineer	5575C	03	1	—	1	2
Civil Engineer	5525C	02	—	—	2	2
Electrical Engineer	5525E	03	—	—	1	1
Electrical Engineer	5525E	02	—	—	1	1
Mechanical Engineer	5525F	03	—	—	1	1
General Engineer*	5525G	03	—	—	2	2
Log Plans & Prog Off	6616	04	—	—	1	1
Exec Support Off	7024	03	—	—	1	1
Family Physician**	9346	03	—	1	—	1
First Sergeant	10090	—	—	—	1	1
Safety Techn	24170	—	—	—	1	1
Disaster Prep Tech**	24270	—	—	1	—	1
Machine Shop Techn	42770	—	—	—	1	1
Machine Shop Spec	42750	—	—	—	1	1
Vehicle Maint Manager	47200	—	—	—	1	1
Spec & Base Veh Equip Supv	47271	—	—	2	4	6
Gen Purp Veh & Body Maint Supv	47275	—	—	—	1	1
Veh Maint Cont & Anal Tech	47274	—	—	—	1	1
Veh Maint Cont & Anal Spec	47234	—	—	—	2	2
Base Vehicle Equip Mech	47250	—	—	4	13	17
Apr Base Vehicle Equip Mech	47230	—	—	—	4	4
Gen Purp Vehicle Mech	47252	—	—	—	3	3
Apr Gen Purp Veh Mech	47232	—	—	—	1	1
*Vehicle Body Mech	47253	—	—	—	2	2
Electrical Supt	54299	—	—	—	1	1
Electrical Techn	54270	—	—	1	3	4
Electrician	54250	—	—	4	4	8
Apr Electrician	54230	—	—	—	4	4
Elec Pwr Line Tech	54271	—	1	1	1	3
Elec Pwr Line Spec	54251	—	—	3	—	3
Apr Elec Pwr Line Spec	54231	—	—	—	4	4
Elec Pwr Pdn Techn	54272	—	1	—	1	2
Elec Pwr Pdn Spec	54252	—	—	3	2	5
Apr Elec Pwr Pdn Spec	54232	—	—	—	1	1
Mechanical Supt	54599	—	—	—	1	1
Refrig & Cryo Tech	54570	—	—	1	—	1
Refrig & Cryo Spec	54550	—	—	—	2	2
Apr Refrig & Cryo Spec	54530	—	—	—	1	1
Liq Fuel Sys Maint Tech**	54571	—	—	1	—	1
Liq Fuel Sys Maint Spec**	54551	—	—	—	1	1
Heating Systems Tech	54572	—	—	1	—	1
Heat Sys Spec	54552	—	—	—	2	2
Apr Heat Sys Spec	54532	—	—	—	1	1
Pave & Const Equip Mgr	55100	—	—	1	—	1
Pave & Const Equip Supt	55199	—	1	—	2	3
Pavements Maint Techn	55170	—	—	2	3	5
Pavements Maint Spec	55150	—	—	4	16	20
Apr Pave Maint Spec	55130	—	—	—	11	11

AFSC DESCRIPTION	AFSC	GRADE	RH-1	RH-2	RH-3	TOTAL
Const Equip Techn	55171	—	—	4	5	9
Const Equip Opr	55151	—	1	30	28	59
Apr Const Equip Opr	55131	—	—	—	18	18
Structural Manager	55200	—	—	—	1	1
★Structural Supt	55299	—	—	1	1	2
★Structural Tech	55273	—	1	1	6	8
Masonry Spec	55251	—	—	—	9	9
Apr Masonry Spec	55231	—	—	—	2	2
Carpentry Spec	55250	—	—	5	25	30
Apr Carpentry Spec	55230	—	—	—	16	16
Metal Fab Tech	55272	—	—	—	1	1
Metal Fab Spec	55252	—	—	1	8	9
Apr Metal Fab Spec	55232	—	—	—	4	4
Plumbing Tech	55275	—	1	1	—	2
Plumbing Spec	55255	—	—	4	7	11
Apr Plumbing Spec	55235	—	—	—	4	4
Engineering Asst Manager	55300	—	1	—	—	1
Engineering Asst Tech	55370	—	2	—	2	4
Engineering Asst Spec	55350	—	2	--	5	7
Apr Engineering Asst Spec	55330	—	—	—	1	1
Production Control Supt	55590	—	—	—	1	1
Production Control Tech	55570	—	1	1	—	2
★Production Control Spec	55550	—	—	—	2	2
★Apr Production Control Spec	55530	—	—	—	1	1
Entomology Spec	56650	—	—	1	—	1
Environ Support Tech	56671	—	1	—	—	1
Environ Support Spec	56651	—	—	2	—	2
Apr Environ Spt Spec	56631	—	—	—	1	1
Vehicle Operations Supv	60370	—	—	—	1	1
Services Spec	61150	—	—	—	1	1
Food Service Supv	62270	—	—	1	1	2
Food Service Spec	62250	—	—	5	4	9
Apr Food Service Spec	62230	—	—	—	4	4
Supply Manager	64500	—	—	—	1	1
Inventory Mgmt Supv	64570	—	—	1	—	1
Inventory Mgmt Spec	64550	—	—	—	5	5
Apr Inv Mgmt Spec	64530	—	—	—	2	2
Mat Facilities Supv	64571	—	—	—	1	1
Mat Facilities Spec	64551	—	—	1	2	3
Apr Mat Fac Spec	64531	—	—	—	1	1
Logistics Plan Tech	66170	—	—	—	2	2
Financial Mgmt Spec	67251	—	—	—	1	1
Financial Mgmt Supv	67273	—	—	—	1	1
Admin Techn	70270	—	—	—	1	1
Admin Spec	70250B	—	—	2	1	3
Apr Admin Spec	70230B	—	—	—	3	3
Administration Techn	70270	—	—	—	1	1
Administration Spec	70250C	—	—	—	2	2
Training Techn	75172	—	—	—	1	1
Training Spec	75132	—	—	—	1	1
Medical Serv Tech	90270	—	1	—	1	2
	TOTAL		16	93	295	404

*Optional 6054 for one 5525G
**Denotes deployment augmentee

RED HORSE COMPOSITE TRAINING REQUIREMENTS FOR CONTINGENCY AND SPECIAL CAPABILITIES TRAINING

Training Sub Area	Category	# Pers. Reqd. To Be Trnd.[1] Sqd. Total	RH-1	RH-2	RH-3
Contingency Capabilities	Basic Rapid Runway Repair-Phase I	400	16	90	294
	Security Defense Trng	400	16	90	294
	Expedient Methods	400	16	90	294
	Explosive Ordnance Recon.	400	16	90	294
	Health Education	400	16	90	294
	Vehicle Operations[2]	400	16	90	294
Special Capabilities[3]	Airfield Lighting	6		3	3
	★Asphalt Paving	6			6
	Communications	6	2	2	2
	Concrete Mobile	12		6	6
	Demolition Team	10		10	
	Disaster Preparedness Team	12	2	4	6
	Expeditionary Barrier Installation	12		12	
	Material Testing	6	2		4
	Quarry Operations	12			12
	Rapid Runway Repair Phase II	12		6	6
	Revetment Erection	12		6	6
	Water Well Drilling	12		8	4
	Bare Base Operations	28	2	11	15
	M-60 Machine (3 per weapon)	18	3	6	9
	40mm Grenade Launcher (2 per weapon)	54	2	14	38

NOTES:

[1]See AFR 93-9, tables 5-1 and 5-2 for training frequencies.

[2]Although not required by AFM 77-310 and AFR 39-1, all personnel assigned to RED HORSE should have a government operators license to operate general purpose vehicles to assist in RRR or any contingency operation assigned to the unit.

[3]The overall percentage rating for the special capabilities subarea will be the average of the individual percentage of personnel trained in each training area comprising that category.

APPENDIX D

RED HORSE Equipment Sets

ITEM	RH-1	RH-2	OVER-SEAS RH-3	ANG RES RH-3	ACTIVE CONUS RH-3	REMARKS
TRUCK AMBULANCE	—	1	—	—	—	
TRUCK, FUEL 1200 GAL	—	2	2	1	1	
TRUCK, TRACTOR AIR TRANSP 44500 GVW 6×4	—	3	1	1	1	
TRUCK, TELEPHONE LINE MAINT/CONST AIR TRANS	—	1	—	—	—	
TRUCK, WRECKER 44500 GVW 6×4 7½TON	—	—	1	1	1	
TRUCK, CARGO 2½ TON 6×6 M35	2	5	11	9	9	
★TRUCK, PICKUP 6 PAX, 4×4	2	—	6	4	4	
★TRUCK, PICKUP 3 PAX, 4×4	—	3	19	17	17	
TRUCK, SHOP VAN, 19000 GVW, 4×4	—	—	1	1	1	
TRUCK, DUMP 8 CY 6×4 AIR TRANSP	—	7	—	—	—	
TRUCK TRACTOR 51000 GVW 6×4	—	—	10	5	5	
TRUCK, DUMP 14 CY 6×4	—	—	10	5	5	
TRUCK, COMMERCIAL CARGO/MAINT BODY	—	1	—	—	—	
TRAILER, WATER 400 GAL	—	2	2	1	1	
TRAILER DOLLY 8 TON	—	1	1	—	—	
TRAILER, CARGO 1½TON M105	—	6	3	1	1	
TRAILER, CARGO VAN 12 TON 30 FT	—	—	4	3	3	
TRAILER, TILT 6 TON	—	—	2	1	1	
TRAILER, CARGO 20 TON 40 FT	—	—	2	1	1	
TRAILER, LOW BED 35 TON	—	2	2	1	1	2 add'l for 200CESHR
TRAILER, LOW BED 50 TON	—	—	4	3	3	
TRAILER, 12000 LBS 2 AXLE 4 WHEEL	—	1	1	1	1	only for 201CESHR and 820CESHR
TRACTOR, FULL TRACK SIZE T-4	—	—	1	1	1	
TRACTOR, FULL TRACK SIZE T-7	—	2	1	0	1	
TRACTOR, FULL TRACK SIZE T-9	—	—	2	2	1	
TRACTOR, FARM IW-70	—	1	1	1	1	
LOADER SCOOP W/BACKHOE	—	2	1	1	1	
SCRAPER 18CY	—	—	4	2	2	
LOADER SCOOP 2½CY W/Q.C.	—	4	3	1	1	
GRADER, ROAD SIZE 5	—	—	3	2	2	
EXCAVATOR, TRK MTD (GRADALL)	—	—	1	1	1	
LOADER SCOOP FULL TRACK 2½CY	—	—	2	2	2	1 can be swapped with a T-7 dozer on RH-2 (optional)
TRUCK, DUMP 20 TON ROCK	—	—	4	0	4	only for 820CESHR

ITEM	RH-1	RH-2	OVER-SEAS RH-3	ANG RES RH-3	ACTIVE CONUS RH-3	REMARKS
TRENCHER SELF PROPELLED RUBBER TIRED	—	1	1	1	1	only for 201CESHR and 820CESHR
GRADER, ROAD SIZE 2	—	3	—	—	—	
EXCAVATOR, CRAWLER MTD	—	—	1	—	1	
LOADER SCOOP 4CY	—	—	1	1	1	
CRANE HYDRAULIC 15TON	—	—	2	1	1	
ROCK DRILL CRAWLER MTD	—	—	3	0	3	only for 820CESHR
CRUSHING & SCREENING PLANT 150 TPH TRLR MTD	—	—	1	0	1	only for 820CESHR
★WELL DRILLING MACHINE	—	1	—	—	—	
DISTRIBUTOR TRUCK WATER 1500 GAL	—	1	1	1	1	
DISTRIBUTOR TRAILER WATER 5000 GAL	—	1	1	1	1	
SWEEPER TOWED ROTARY BROOM	—	1	1	1	1	
CLEANER, VACUUM MULTI-PURPOSE AIR TRANSP	—	1	1	0	1	
ROLLER TOWED 13 TIRED	—	—	2	1	1	
KETTLE HEATING BIT. JOINT SEALER 165 GAL	—	1	—	—	—	
MIXER ROTOR TILLER SELF PROPELLED	—	1	1	1	1	
BATCH PLANT CONCRETE	—	—	1	—	—	
DISTRIBUTOR ASPHALT TRUCK 800 GAL	—	1	—	—	—	
MIXER CONCRETE TRAILER MTD 6 CU FT	—	1	1	1	1	
CONCRETE MIXER 8CY TRUCK MTD	—	—	6	—	—	
CONCRETE MOBILE 8CY	—	1	1	1	0	
PAVING MACHINE ASPHALT RUBBER TIRED	—	—	1	1	1	not authorized for RES
ROLLER VIBRATING SELF PROPELLED TY II, CL 2	—	1	1	1	1	
CONVEYOR MATERIAL AGGREGATE PORTABLE	—	—	3	0	3	*ONLY FOR 820CSHR
FORKLIFT 10K ADVERSE TERRAIN 463L	—	2	1	1	1	
TRUCK FORKLIFT 6K	—	—	2	2	2	

RED HORSE COMBAT ESSENTIAL VEHICLES

ITEM	RH-1	RH-2	OVERSEAS RH-3	CONUS RH-3	REMARKS
TRUCK, FUEL 1200 GAL	—	1	1	1	
TRUCK, TRACTOR AIR TRANSP 44500 GVW 6x4		3	—	—	
TRUCK TELEPHONE LINE MAINT/CONST AIR TRANS	—	1	—	—	
TRUCK CARGO 2½ TON 6x6 M35	2	4	5	5	
TRUCK PICKUP 3 PAX 4x4	—	2	6	6	
★TRUCK, PICKUP 6 PAX 4x4	2	—	—	—	Truck, Jeep 4x4 or truck, pickup 4x4, 3 PAX from RH-3 assets when 6 PAX pickup not assigned
TRUCK, DUMP 8 CY 6x4 AIR TRANSP	—	5	—	—	
TRUCK TRACTOR 51000 GVW 6x4	—	—	6	4	
TRUCK, DUMP 14 CY 6x4	—	—	6	4	
TRAILER, WATER 400 GAL	—	—	1	1	
TRAILER, TILT 6 TON	—	—	1	1	
TRAILER, CARGO 20 TON 40 FT	—	—	1	1	
TRAILER, LOW BED 35 TON	—	2	2	1	
TRAILER, LOW BED 50 TON	—	—	3	2	
TRACTOR, FULL TRACK SIZE T-7	—	2	—	—	
TRACTOR, FULL TRACK SIZE T-9	—	—	2	1	
TRACTOR, FARM IW-70	—	1	1	1	
LOADER SCOOP W/BACKHOE	—	1	1	1	
SCRAPER 18CY	—	—	2	2	
LOADER SCOOP 2½CY W/Q.C.	—	3	2	1	
GRADER, ROAD SIZE 5	—	—	2	2	
LOADER SCOOP FULL TRACK 2½CY	—	—	1	1	
TRUCK, DUMP 20 TON ROCK	—	—	—	2*	*only for 820 CESHR
TRENCHER SELF PROPELLED RUBBER TIRED	—	1	1	—	
GRADER, ROAD SIZE 2	—	2	—	—	
EXCAVATOR, CRAWLER MTD	—	—	1	1	
LOADER SCOOP 4 CY	—	—	1	1	
CRANE HYDRAULIC 15 TON	—	—	1	1	
ROCK DRILL CRAWLER MTD	—	—	—	2*	*only fr 820 CESHR
CRUSHING & SCREEN PLANT 150 TPH TRLR MTD	—	—	—	1*	*only for 820 CESHR
★WELL DRILLING MACHINE	—	1	—	—	
DISTRIBUTOR TRAILER WATER 5000 GAL	—	1	1	1	
SWEEPER TOWED ROTARY BROOM	—	1	1	1	
★CLEANER, VACUUM MULTI-PURPOSE AIR TRANSP	—	1	1	1*	only for 820 CESHR and 823 CESHR
MIXER ROTO TILLER SELF-PROPELLED	—	1	1	1	
CONCRETE MOBILE 8CY	—	1	—	—	
ROLLER VIBRATING SELF-PROPELLED TY II, CL 2	—	1	1	1	
CONVEYOR MATERIAL AGGREGATE PORTABLE	—	—	—	1*	*only for 820 CESHR
FORKLIFT 10K ADVERSE TERRAIN 46 II	—	1	1	1	
TOTALS (does not include *items)	4	37	53	43	

RED HORSE COMBAT ESSENTIAL SHOP EQUIPMENT

ITEM	QUANTITY REQUIRED RH–1	RH–2	RH–3	SQD TOTAL
5 kw Generator	—	2	2	4
MC–7 Compressor	—	1	1	2
Floodlight Sets [1]	—	4	4	8
Jackhammers	—	4	4	8
Reciprocating Pumps	—	2	2	4
Welding & Cutting Torch Set [2]	—	2	2	4
TOTAL	N/A	15	15	30

NOTES: [1] For NF–2 light-all units must include support generator to measure as complete.
[2] Includes oxygen, acetylene bottles, and torch kit.

RED HORSE MEASUREMENT QUANTITIES FOR TENTS

ITEM	QUANTITY REQUIRED RH–1	RH–2	RH–3	SQD TOTAL
Tent, General Purpose Med.	2	10	30	42

NOTE: A tent must be complete with all necessary component poles and pegs to be measured as complete.

RED HORSE MEASUREMENT QUANTITIES FOR PERSONNEL SUPPORT EQUIPMENT

ITEM	QUANTITY REQUIRED RH-1	RH-2	RH-3	SQD TOTAL
Water Purification Unit [1]		1	1	2
Comparator Water Test Set	1	1	1	3
Mobile Field Kitchen [2]		1	1	2
Tank Fabric Collapsible		2	2	4
Turbidimeter		1	1	2
Air Transportable Clinic		1		1
Team First Aid Kit	1			1
Sprayer Insecticide		1	1	2
Field Shower Unit		1	1	2
TOTAL	2	9	8	19

NOTES: [1] May be either erdlator or ROWPU.

[2] Includes MKT-75 mobile kitchen trailer or kitchen tent and all associated kitchen equipment and components to provide field feeding capability.

RED HORSE MEASUREMENT QUANTITIES FOR SHOP SUPPORT EQUIPMENT

ITEM	QUANTITY REQUIRED RH-1	RH-2	RH-3	SQD TOTAL
500 Gal Fuel Bladders		4	2	6
30 kw Portable Gen.		1	1	2
Towed Welding Machine		1	1	2
Portable Compressors (handtools)		1	1	2
Arc Welders			1	1
Telescoping Hot Stick		1	1	2
Trl-Mtd Carp Shop w/gen		1	1	2
Transit/Theodilyte w/tripod	2		2	4
Portable Radios	2	6	6	14
Pump 1000 gpm		1	1	2
Tent Lighting Set		1	2	3
Long Range HF Radios	1		1	2
Meter, Elec, Amp, Volt, ohm	1	1	1	3
Rescue Saws	1	1	1	3
Chain Saws	1	1	1	3
TOTAL	8	20	23	51

APPENDIX E

CS-1 SQUADRON COMPOSITION (UTCID 4F9DA)

AC CODE	POSITION TITLE	AFSC	GRADE	QTY	CODE*
4400 Civil Engineering					
	Civil Eng Staff Off	05516	05	1	C
	First Sergeant	10090		1	
	Appr Admin Spec	70230		1	
	Administration Spec	70250		1	
4420 Engineering & Environmental Planning					
	CE Off General	05525G	03	1	C
	Appr Engr Asst	55330		1	
	Engr Asst Spec	55350		3	C
	Engr Asst Spec	55350		4	
	Engr Asst Tech	55370		1	C
	Engr Asst Tech	55370		2	
4430 Operations					
	Civil Eng Staff Off	05516	04	1	C
	CE Off General	05525G	03	5	C
	CE Off General	05525G	03	2	
	Prod Control Spec	55550		1	C
	Prod Control Spec	55550		5	
	Prog/Work Cont Tech	55570		1	C
	Prog/Work Cont Tech	55570		2	
	Appr Admin Spec	70230		1	
	Administration Spec	70250		1	
	Training Technician	75172		1	
4438 Logistics					
	Inventory Mgmt Spec	64550		2	
	Inventory Mgmt Supv	64570		1	
	Inventory Facil Spec	64551		1	
4440 Pavements & Grounds Supervision					
	Pave&Const Equip Mgr	55100		1	
4441 Equipment Operations					
	Appr Const Equip Opr	55131		4	C
	Const Equip Operator	55151		4	C
	Const Equip Operator	55151		3	
	Const Equip Tech	55171		2	C
	Const Equip Tech	55171		1	
4442 Pavements					
	Appr Pvmnt Maint Spec	55130		4	C
	Appr Pvmnt Maint Spec	55130		2	
	Pavement Maint Spec	55150		3	C
	Pavement Maint Spec	55150		4	
	Pavement Maint Tech	55170		1	C
	Pavement Maint Tech	55170		1	

A/ CODE	POSITION TITLE	AFSC	GRADE	QTY	CODE*
4.0	Structures Supervision				
	Structural Tech	55273		2	
	Structural Supt	55299		1	
451	Structural Maintenance				
	Appr Carpenter	55230		9	
	Carpenter Specialist	55250		2	C
	Carpenter Specialist	55250		7	
453	Plumbing				
	Appr Plumber	55235		1	C
	Appr Plumber	55235		6	
	Plumbing Spec	55255		2	C
	Plumbing Spec	55255		5	
	Plumbing Tech	55275		1	C
	Plumbing Tech	55275		1	
54	Metal Working				
	Appr Metal Fabri Spec	55232		3	
	Metal Fabri Spec	55252		3	
	Metal Fabri Tech	55272		1	
455	Masonry				
	Mason	55231		1	
	Masonry Spec	55251		2	
461	Refrigeration & Air Conditioning				
	Appr Refrig Spec	54530		7	
	Refrig Spec	54550		2	C
	Refrig Spec	54550		5	
	Refrig Tech	54570		2	
	CE Control Spec	54533		3	
	CE Control Tech	54573		1	
462	Liquid Fuel System Maintenance				
	Liquid Fuel Sys Appr	54531		1	
	Liquid Fuel Sys Spec	54551		2	C
463	Heating Systems				
	Heating Sys Appr	54532		6	
	Heating Sys Appr	54532		1	C
	Heating Sys Spec	54552		7	
	Heating Sys Spec	54552		1	C
	Heating Sys Tech	54572		1	
	Heating Sys Tech	54572		1	C
470	Electrical Supervision				
	Electrical Supt	54299		1	

AC CODE	POSITION TITLE	AFSC	GRADE	QTY	CODE*
4471	Interior Electric				
	Appr Electrician	54230		4	
	Appr Electrician	54230		1	C
	Electrician	5425		3	
	Electrician	54250		2	C
	Electrical Tech	54270		2	
4472	Exterior Electric				
	Appr El Pwr Line Spec	54231		1	
	Appr El Pwr Line Spec	54231		2	C
	Elec Power Line Spec	54251		2	
	Elec Power Line Spec	54251		2	C
	Elec Power Line Tech	54271		1	C
4480	Electric Power Production				
	Appr El Pwr Pro Spec	54232		3	
	Appr El Pwr Pro Spec	54232		1	C
	Elec Power Pro Spec	54252		3	
	Elec Power Pro Spec	54252		2	C
	Elec Power Pro Tech	54272		1	C
4491	Water and Waste				
	Appr Envir Sup Spec	56631		4	
	Envir Support Spec	56651		3	
	Envir Support Spec	56651		1	C
	Envir Support Tech	56671		1	C
4493	Engineer Entomology				
	Appr Pest Mgmt Spec	56630		1	
	Pest Mgmt Spec	56650		2	

*"C" Indicates critical positions for SORTS calculations.

CS-2 SQUADRON COMPOSITION (UTCID 4F9DB)

FAC CODE	POSITION TITLE	AFSC	GRADE	QTY	CODE*
4400 Civil Engineering					
	Civil Eng Staff Off	05516	05	1	C
	First Sergeant	10090		1	
	Appr Admin Spec	70230		1	
	Administration Spec	70250		1	
4420 Engineering & Environmental Planning					
	CE Off General	05525G	03	1	C
	Engr Asst Spec	55350		3	
	Engr Asst Spec	55350		2	C
	Engr Asst Tech	55370		2	
	Engr Asst Tech	55370		1	C
4430 Operations					
	CE Off General	05525G	03	3	C
	CE Off General	05525G	03	1	
	Prod Control Spec	55550		1	C
	Prod Control Spec	55550		4	
	Prog/Work Cont Tech	55570		1	C
	Prog/Work Cont Tech	55570		1	
	Appr Admin Spec	70230		1	
	Administration Spec	70250		1	
	Training Technician	75132		1	
4438 Logistics					
	Inventory Mgmt Spec	64550		2	
	Inventory Mgmt Supv	64570		1	
	Inventory Facil Spec	64551		1	
4440 Pavements & Grounds Supervision					
	Pave & Const Equip Mgr	55100		1	
4441 Equipment Operations					
	Appr Const Equip Opr	55131		2	
	Appr Const Equip Opr	55131		2	C
	Const Equip Operator	55151		3	C
	Const Equip Tech	55171		2	C
4442 Pavements					
	Appr Pvmnt Maint Spec	55130		2	C
	Appr Pvmnt Maint Spec	55130		5	
	Pavement Maint Spec	55150		3	C
	Pavement Maint Tech	55170		1	C
	Pavement Maint Tech	55170		1	
4450 Structures Supervision					
	Structural Tech	55273		2	
	Structural Supt	55299		1	

FAC CODE	POSITION TITLE	AFSC	GRADE	QTY	CODE*
4451 Structural Maintenance					
	Appr Carpenter	55230		5	
	Carpenter Specialist	55250		6	
	Carpenter S, ecialist	55250		1	C
4453 Plumbing					
	Appr Plumber	55235		1	C
	Appr Plumber	55235		5	
	Plumbing Spec	55255		2	C
	Plumbing Spec	55255		3	
	Plumbing Tech	55275		1	C
4454 Metal Working					
	Appr Metal Fabri Spec	55232		1	
	Metal Fabri Spec	55252		3	
	Metal Fabri Tech	55272		1	
4455 Masonry					
	Appr Mason	55231		1	
	Masonry Spec	55251		2	
4461 Refrigeration & Air Conditioning					
	Appr Refrig	54530		5	
	Refrig Spec	54550		1	C
	Refrig Spec	54550		4	
	Refrig Tech	54570		1	
	CE Control Spec	54533		3	
	CE Control Tech	54573		1	
4462 Liquid Fuel System Maintenance					
	Liquid Fuel Sys Appr	54531		1	
	Liquid Fuel Sys Spec	54551		1	
	Liquid Fuel Sys Spec	54551		1	C
4463 Heating Systems					
	Heating Sys Appr	54532		5	
	Heating Sys Spec	54552		5	
	Heating Sys Spec	54552		1	C
	Heating Sys Tech	54572		1	
	Heating Sys Tech	54572		1	C
4470 Electrical Supervision					
	Electrical Supt	54299		1	
4471 Interior Electric					
	Appr Electrician	54230		4	
	Electrician	54250		2	
	Electrician	54250		2	C
	Electrical Tech	54270		1	

FAC CODE	POSITION TITLE	AFSC	GRADE	QTY	CODE*
4472 Exterior Electric					
	Appr El Pwr Line Spec	54231		1	C
	Elec Power Line Spec	54251		1	
	Elec Power Line Spec	54251		2	C
	Elec Power Line Tech	54271		1	C
4480 Electric Power Production					
	Appr El Pwr Pro Spec	54232		2	
	Elec Power Pro Spec	54252		1	
	Elec Power Pro Spec	54252		2	C
	Elec Power Pro Tech	54272		1	C
4491 Water and Waste					
	Appr Envir Sup Spec	56631		3	
	Envir Support Spec	56651		2	
	Envir Support Spec	56651		1	C
	Envir Support Tech	56671		1	C
4493 Engineer Entomology					
	Appr Pest Mgmt Spec	56630		1	
	Pest Mgmt Spec	56650		2	

*"C" indicates critical positions for SORTS calculations.

CS-3 SQUADRON COMPOSITION (UTCID 4F9DC)

AC CODE	POSITION TITLE	AFSC	GRADE	QTY	CODE*
4400 Civil Engineering					
	Civil Eng Staff Off	05516	05	1	C
	Administration Spec	70250		1	
4420 Engineering & Environmental Planning					
	Engr Asst Spec	55350		1	C
	Engr Asst Spec	55350		2	
	Engr Asst Tech	55370		1	C
4430 Operations					
	CE Off General	05525G	03	3	C
	CE Off General	05525G	03	1	
	Prod Control Spec	55550		1	C
	Prod Control Spec	55550		3	
	Prog/Work Cont Tech	55570		1	
4438 Logistics					
	Appr Inv Mgmt Spec	64530		1	
	Inventory Mgmt Spec	64550		1	
	Inventory Mgmt Supv	64570		1	
	Inventory Facil Spec	64551		1	
4441 Equipment Operations					
	Appr Const Equip Opr	55131		2	
	Appr Const Equip Opr	55131		2	C
	Const Equip Operator	55151		2	C
	Const Equip Tech	55171		1	C
	Const Equip Tech	55171		1	
4442 Pavements					
	Appr Pvmnt Maint Spec	55130		2	C
	Appr Pvmnt Maint Spec	55130		1	
	Pavement Maint Spec	55150		1	C
	Pavement Maint Spec	55150		2	
	Pavement Maint Tech	55170		1	C
4450 Structures Supervision					
	Structural Tech	55273		1	
	Structural Supt	55299		1	
4451 Structural Maintenance					
	Appr Carpenter	55230		5	
	Carpenter Specialist	55250		1	C
	Carpenter Specialist	55250		3	
4453 Plumbing					
	Appr Plumber	55235		1	C

AC CODE	POSITION TITLE	AFSC	GRADE	QTY	CODE*
	Appr Plumber	55235		3	
	Plumbing Spec	55255		3	
	Plumbing Tech	55275		1	C
4454 Metal Working					
	Appr Metal Fabri Spec	55232		1	
	Metal Fabri Spec	55252		2	
	Metal Fabri Tech	55272		1	
4455 Masonry					
	Appr Mason	55231		1	
	Masonry Spec	55251		1	
4461 Refrigeration & Air Conditioning					
	Appr Refrig Spec	54530		3	
	Refrig Spec	54550		1	C
	Refrig Spec	54550		3	
	Refrig Tech	54570		1	
	CE Control Spec	54533		1	
4462 Liquid Fuel System Maintenance					
	Liquid Fuel Sys Appr	54531		1	
	Liquid Fuel sys Spec	54551		1	C
4463 Heating Systems					
	Heating Sys Appr	54532		2	
	Heating Sys Appr	54532		1	C
	Heating Sys Spec	54552		3	
	Heating Sys Spec	54552		1	C
	Heating Sys Tech	54572		1	
4470 Electrical Supervision					
	Electrical Supt	54299		1	
4471 Interior Electric					
	Appr Electrician	54230		2	
	Electrician	54250		2	
	Electrician	54250		1	C
	Electrical Tech	54270		1	
4472 Exterior Electric					
	Appr El Pwr Line Spec	54231		1	C
	Elec Power Line Spec	54251		1	
	Elec Power Line Spec	54251		1	C
	Elec Power Line Tech	54271		1	C
4480 Electric Power Production					
	Appr El Pwr Pro Spec	54232		2	
	Elec Power Pro Spec	54252		1	C
	Elec Power Pro Tech	54272		1	C

AC CODE	POSITION TITLE	AFSC	GRADE	QTY	CODE*
	Elec Power Pro Spec	54252		1	
4491 Water and Waste					
	Appr Envir Sup Spec	56631		2	
	Envir Su port Spec	56651		2	
	Envir Su port Spec	56651		1	C
4493 Engineer Entomology					
	Pest Mgmt Spec	56650		1	

*"C" indicates critical positions for SORTS calculations.

CS-4 SQUADRON COMPOSITION (UTCID 4F9DD)

.C CODE	POSITION TITLE	AFSC	GRADE	QTY	CODE*
400	Civil Engineering				
	Civil Eng Staff Off	05516	4	1	C
420	Engineering & Environmental Planning				
	Engr Asst Spec	55350		1	C
	Engr Asst Spec	55350		1	
4430	Operations				
	CE Off General	05525G	03	2	C
	CE Off General	05525G	03	1	
	Prod Control Spec	55550		1	
	Prog/Work Cont Tech	55570		1	
4441	Equipment Operations				
	Appr Const Equip Opr	55131		1	
	Appr Const Equip Opr	55131		2	C
	Const Equip Operator	55151		1	C
	Const Equip Operator	55151		1	
	Const Equip Tech	55171		1	
4442	Pavements				
	Appr Pvmnt Maint Spec	55130		2	C
	Pavement Maint Spec	55150		2	
4451	Structural Maintenance				
	Appr Carpenter	55230		2	
	Carpenter Specialist	55250		1	C
	Carpenter Specialist	55250		1	
4453	Plumbing				
	Appr Plumber	55235		2	
	Plumbing Spec	55255		2	
	Plumbing Tech	55275		1	
4461	Refrigeration & Air Conditioning				
	Appr Refrig Spec	54530		2	
	Refrig Spec	54550		1	C
	Refrig Spec	54550		1	
	Refrig Tech	54570		1	
4462	Liquid Fuel System Maintenance				
	Liquid Fuel Sys Appr	54531		1	
4463	Heating Systems				
	Heating Sys Appr	54532		1	
	Heating Sys Appr	54532		1	C
	Heating Sys Spec	54552		2	

AC CODE	POSITION TITLE	AFSC	GRADE	QTY	CODE*
4471	Interior Electric				
	Appr Electrician	54230		1	C
	Electrician	54250		2	
	Electrical Tech	54270		1	
4472	Exterior Electric				
	Appr El Pwr Line Spec	54231		1	C
	Appr El Pwr Line Spec	54231		1	
	El Pwr Line Spec	54251		1	
4480	Electric Power Production				
	Appr El Pwr Pro Spec	54232		1	C
	Appr El Pwr Pro Spec	54232		1	
	Elec Power Pro Tech	54252		2	
4491	Water and Waste				
	Appr Envir Sup Spec	56631		1	
	Envir Support Spec	56651		1	

*"C" indicates critical positions for SORTS calculations.

APPENDIX F

S-1 THROUGH S-3 TEAM COMPOSITION

S-1 Staff Augmentation Management Team (UTCID 4F9S1)

FAC CODE	POSITION TITLE	AFSC	GRADE	QUANTITY
1700	Engineering & Services Staff			
	Civil Eng Staff Off	05516	05	4
	Civil Eng Staff Off	05516	04	4
	CE Off General	05525G	03	2
	Civil Eng Director	05596	06	1
	Electrical Mgr	54200		1
	Engr Asst Mgr	55300		1
	Production Cont Mgr	55500		1
	Administration Tech	70270		2
				16

S-2 Limited Staff Augmentation (UTCID 4F9S2)

FAC CODE	POSITION TITLE	AFSC	GRADE	QUANTITY
1700	Engineering & Services Staff			
	Civil Eng Staff Off	05516	05	1
	Civil Eng Staff Off	05516	04	2
	Prog/Wk Control Supt	55590		1
	Administration Spec	70250		2
				6

S-3 Northern Region (RWCM-NR) Management (UTCID 4F9S3)

FAC CODE	POSITION TITLE	AFSC	GRADE	QUANTITY
1700	Engineering & Services Staff			
	Civil Eng Director	05596	06	2
	Civil Eng Staff Off	05516	05	1
	Civil Eng Staff Off	05516	04	2
	CE Off General	05525G	03	5
	Exec Support Off	07024	05	1
	Judge Advocate Staff	08816	05	1
	Production Cont Mgr	55500		1
	Fire Protection Mgr	57100		1
	Supply Manager	64500		1
	Inventory Mgmt Supv	64500		1
	Administration Spec	70250		1
	Administration Tech	70270		2
	Administration Supt	70290		1
				20

ES-1 AND ES-2 TEAM COMPOSITION

ES-1 HQ AFESC Civil Engineering Maintenance, Inspection, Repair, and Training (CEMIRT) Team (UTCID 4F9AC)

NO.	AFSC	Specialty
2	54250	Interior Electrician
1	54272	Electrical Power Production
2	54252	Electrical Power Production
2	54553	Control Specialists
7		

ES-2 HQ AFESC Pavements Evaluation Team (UTCID 4F9AD)

NO.	AFSC	Specialty
1	5525C	Officer
1	55390	Engineering Assistant Superintendent
1	55370	Engineering Assistant
1	55350	Engineering Assistant
4		

APPENDIX G

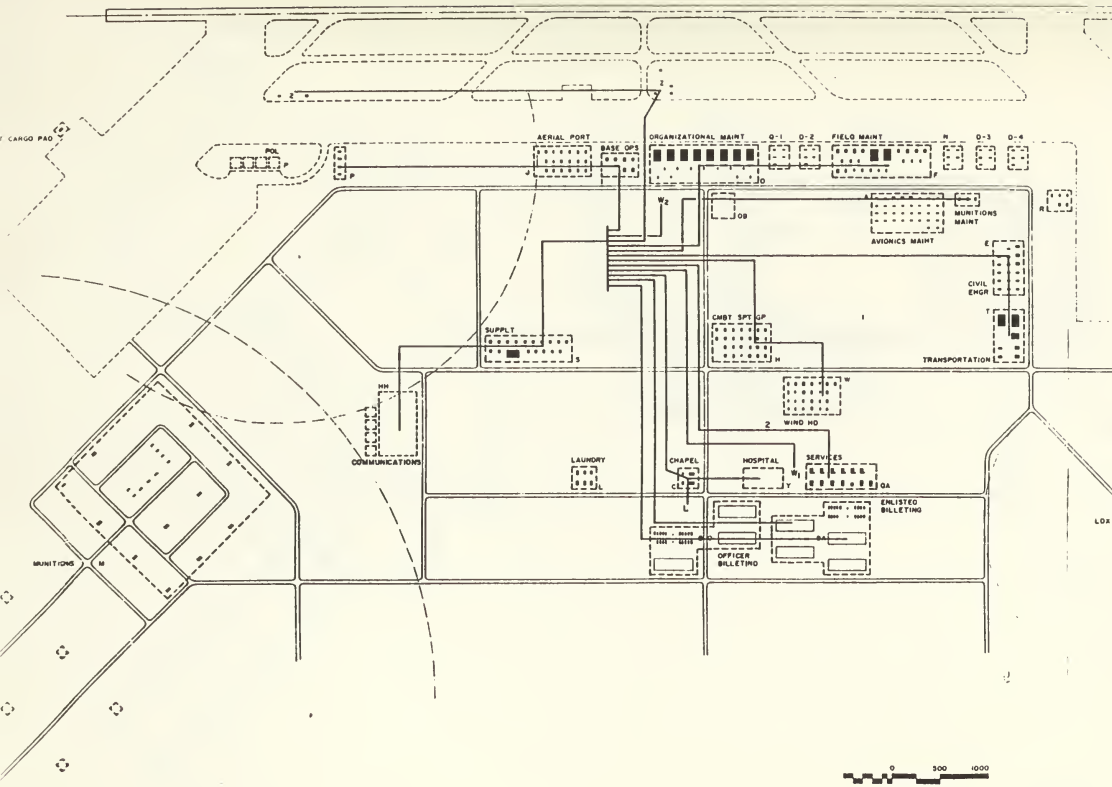
FACILITY REQUIREMENTS DATA

FUNCTION	SHELTER TYPE	TA-158	BASE POPULATION												
			750	1500	2250	3000	3750	4500	5250	6000	6750	7500	8250	9000	12000	15000
HQ Combat Support Gp/ Administration	EXP	AA	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Central Reproduction	TEMPER	AAA	0	1	1	1	1	1	1	1	1	1	1	1	1	1
Post Office	TEMPER	AAB	0	1	1	1	1	1	2	2	2	2	2	2	2	2
Base Message Distribution Center (BITS)	TEMPER	AAC	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Chaplain	TEMPER	AAD	1	1	1	1	1	1	2	2	2	2	2	2	2	2
Judge Advocate/ Procurement	TEMPER	AAE	1	1	1	1	1	2	2	2	2	2	2	3	3	3
Personnel Operations Center	TEMPER	AAF	1	2	2	2	2	3	3	3	3	4	4	4	5	5
Base Administration	TEMPER	AAG	0	1	1	1	1	1	2	2	2	2	2	2	2	2
4449 MOBSS Liaison	TEMPER	AAH	1	1	1	1	1	1	1	1	1	1	1	1	1	1
BCE CMD Admin/Program	TEMPER	ABA	1	1	1	1	1	1	1	2	2	2	2	2	2	2
Engineering Management	TEMPER	ABB	1	1	1	1	1	1	2	2	2	2	2	2	2	2
Material Management/Tool Crib	TEMPER	ABC	1	1	1	2	2	2	2	2	2	2	2	2	3	3
Fire Ops/Technical Services	TEMPER	ABD	1	1	1	1	1	1	2	2	2	2	2	2	2	2
Crash Rescue	TEMPER	ABE	1	2	2	3	3	3	3	4	4	4	4	4	4	4
Operations Work/Control	TEMPER	ABF	1	1	1	1	1	1	2	2	2	2	2	2	3	3
Plumbing Water & Waste	TEMPER	ABG	1	3	3	3	3	3	3	3	3	3	3	3	3	3
Sheet Metal	TEMPER	ABH	0	1	1	1	1	1	1	1	1	2	2	2	2	2
Refrigeration/Air-Conditioning	TEMPER	ABJ	1	2	2	2	2	2	2	2	2	3	3	3	3	3
Heating/POL	TEMPER	ABK	1	1	1	2	2	2	2	2	2	2	2	2	2	2
Electric Shop	TEMPER	ABL	1	2	2	2	2	2	2	2	2	2	2	2	2	2
Power Pro/Barrier Maint	TEMPER	ABM	2	4	4	4	4	4	4	4	4	4	4	4	4	4
Power Pro/Barrier Maint	GP	ABN	1	1	1	1	2	2	2	2	2	2	2	2	2	2
Pest Control	TEMPER	ABN	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pavement/Equipment	GP	ABP	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pavement/Equipment	TEMPER	ABP	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Carpenter Shop	TEMPER	ABQ	1	1	1	2	2	2	2	2	2	2	2	2	2	2
Security/Control Center	TEMPER	ACA	1	1	1	1	1	1	1	1	1	2	2	2	2	2
Armory	ESC	ACB	1	1	1	1	1	1	1	1	1	2	2	2	3	3
New HE Kitchen (9-1)	150 cf Refrigerator	ADA	8	16	16	24	32	32	40	48	48	56	64	64	88	112
New HE Kitchen (9-1)	Condenser (150)	ADA	8	16	16	24	32	32	40	48	48	56	64	64	88	112
New HE Kitchen (9-1)	TEMPER	ADA	1	2	2	3	4	4	5	6	6	7	8	8	11	14
HB Kitchen (Ref 150)	150 cf Refer	JC	4	6	10	12	16	18	22	24	28	30	34	36	48	60
HB Kitchen (Condenser)	Condenser (150)	JC	4	6	10	12	16	18	22	24	28	30	34	36	48	60
HB Kitchen (Kitchen)	ESC	JC	2	3	5	6	8	9	11	12	14	15	17	18	24	30
HB Kitchen (Dry Food)	EXP	JC	2	3	5	6	8	9	11	12	14	15	17	18	24	30
HB Kitchen (Dining Hall)	GP	JC	2	3	5	6	8	9	11	12	14	15	17	18	24	30
HB Kitchen (Rations)	.	JC	1	1	1	2	2	2	3	3	3	4	4	4	6	7
HB Kitchen (Rations)		JC	2	2	2	4	4	4	6	6	6	8	8	8	12	14
HB Kitchen (Food Storage)	GP	JC	1	1	1	2	2	2	3	4	4	5	5	6	8	9
Tactical Field Exchange	TEMPER	ADD	1	1	1	1	2	2	2	3	3	3	3	3	4	4
Laundry	TEMPER	ADE	2	3	4	5	7	8	10	11	12	14	15	16	22	27
Laundry	Laundry Unit	ADE	2	3	4	5	7	8	10	11	12	14	15	16	22	27
Mortuary	TEMPER	ADF	2	2	2	3	3	3	4	4	5	5	6	6	8	10
Mobile Kitchen Trailer	MKT-75	ADC	3	3	3	3	3	3	3	3	3	3	3	3	3	3

FUNCTION	SHELTER TYPE	TA-158	BASE POPULATION													
			750	1500	2250	3000	3750	4500	5250	6000	6750	7500	8250	9000	12000	15000
Chief of Supply Assest Manager	TEMPER	AEA	1	1	1	2	2	2	2	3	3	3	4	4	4	4
Demand Processing/ Research	ESC	AEB	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Demand Processing/ Research	TEMPER	AEB	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Material Facilities	TFS*	AEC	0	0	0	0	0	1	1	1	1	1	1	2	2	2
Material Facilities	GP	AEC	1	1	1	2	2	0	0	0	0	0	0	0	0	0
Material Facilities	TEMPER	AEC	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Transportation/Vehicle Operations	TEMPER	AFA	1	1	1	1	1	1	2	2	2	2	2	2	2	2
Vehicle Maintenance	GP	AFB	2	2	2	2	2	2	2	2	2	2	2	2	3	3
Vehicle Maintenance	TFS*	AFB	0	0	0	1	1	1	1	2	2	2	2	2	2	2
Traffic Mangement	TEMPER	AFC	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Twelve-Person Billets	TEMPER	AGA	66	130	195	260	326	390	455	520	585	650	715	780	1040	1300
Communication/Command Administration	TEMPER	AHA	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Communications Center	TEMPER	AHB	0	0	0	0	0	1	1	1	1	1	1	1	1	1
Electro Mechanical Maintenance	TEMPER	AHD	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Navigation Aids	TEMPER	AHE	0	0	0	0	0	1	1	1	1	1	1	1	1	1
Fuels QC	ESC	AJB	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fuels Storage	TEMPER	AJA	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Tenant Support Aerial Port	TEMPER	AKA	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Air Rescue	TEMPER	AKB	1	1	1	1	1	1	1	1	1	2	2	2	2	2
Airlift Control	TEMPER	AKC	1	1	1	1	1	1	1	1	1	1	1	1	1	1

* - Tension Fabric Shelter

APPENDIX H



AREA	FACILITY GROUP	STRUCTURE TYPE						
		TEM	EXP	ESC	GPS	ACH	FLD	LAT
A	AVIONICS MAINT			10				
BA	BILLETING ENLISTED	43						3
BB	BILLETING ENLISTED							
BC	BILLETING ENLISTED							
BD	BILLETING ENLISTED							
BO	BILLETING OFFICER	10						
C	CHAPEL	1						
DA	SERVICES AREA A	1	7	2	3			
DC	SERVICES AREA C							
E	CIVIL ENGINEERING	12		7				
F	FIELD MAINT							
H	HQ COMBAT SUPPORT GP	2	4	8				
HH	COMMUNICATIONS							
I	BASE OPS/FIRE DEPT	4	1	1				1
J	AERIAL PORT	4						
K	LOX							
L	LAUNDRY SERVICES	1						
M	MUNITIONS							
N	TAC AIRLIFT SQ							
O	ORGANIZATIONAL MAINT							
P	POL				1			
Q	TAC FIGHTER SQ							
R	TAC RECON SQ							
S	SUPPLY	3		1				
T	TRANSPORTATION	1			2	1		
W	WING HQ							
Y	HOSPITAL							
Z	AIRFIELD FACILITIES							

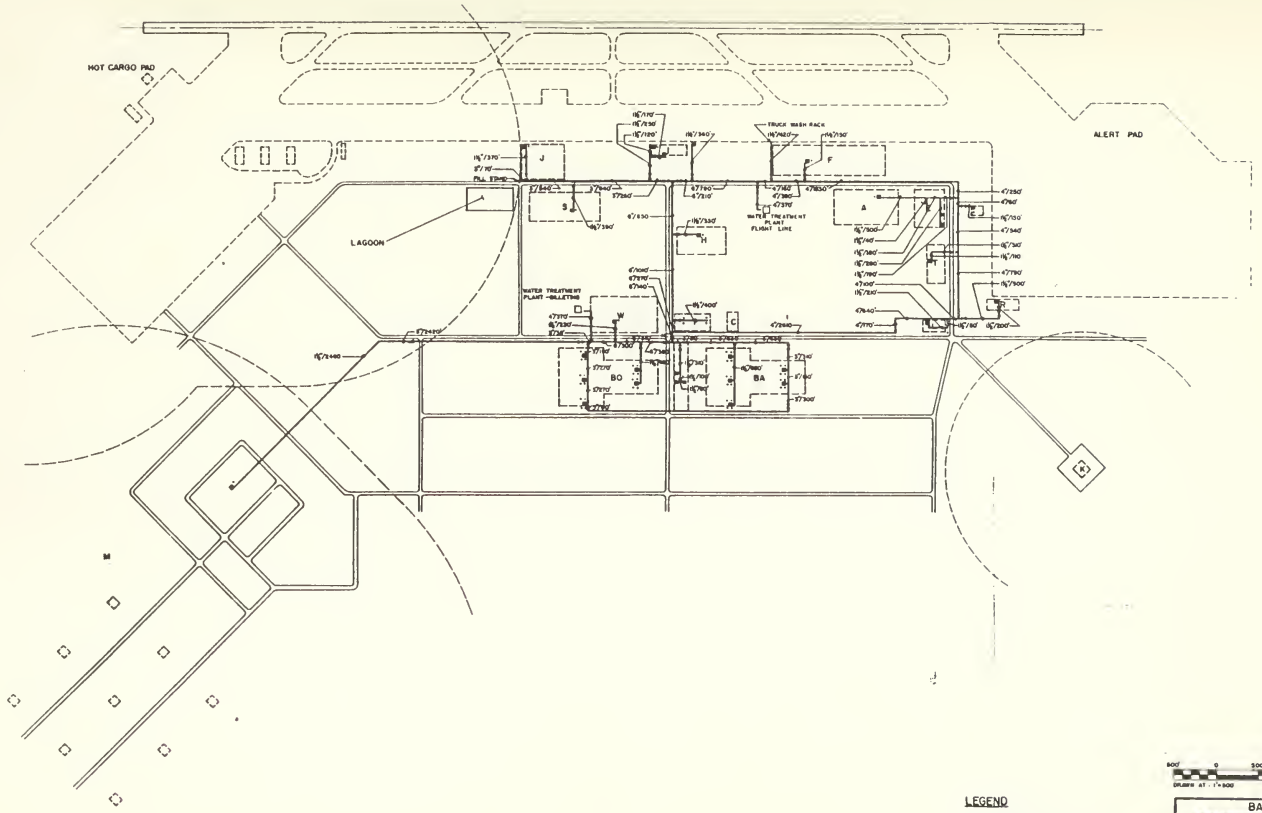
BARE BASE

CONCEPTUAL PLAN

DISPERSED AIR BASE

ELECTRICAL DISTRIBUTION SYSTEM

POPULATION 750



LEGEND

- DIG —— BUTTERFLY VALVE
- ■ —— BUILDING
- ⊕ —— DRINKING FOUNTAIN/CHILLER
- 6"/200' —— PIPE DIAMETER / LENGTH OF RUN
- ◀ —— PUMP
- NC —— NORMALLY CLOSED

500' 0 500' 1000' 1500'

GRAPHIC SCALE: 1" = 500'

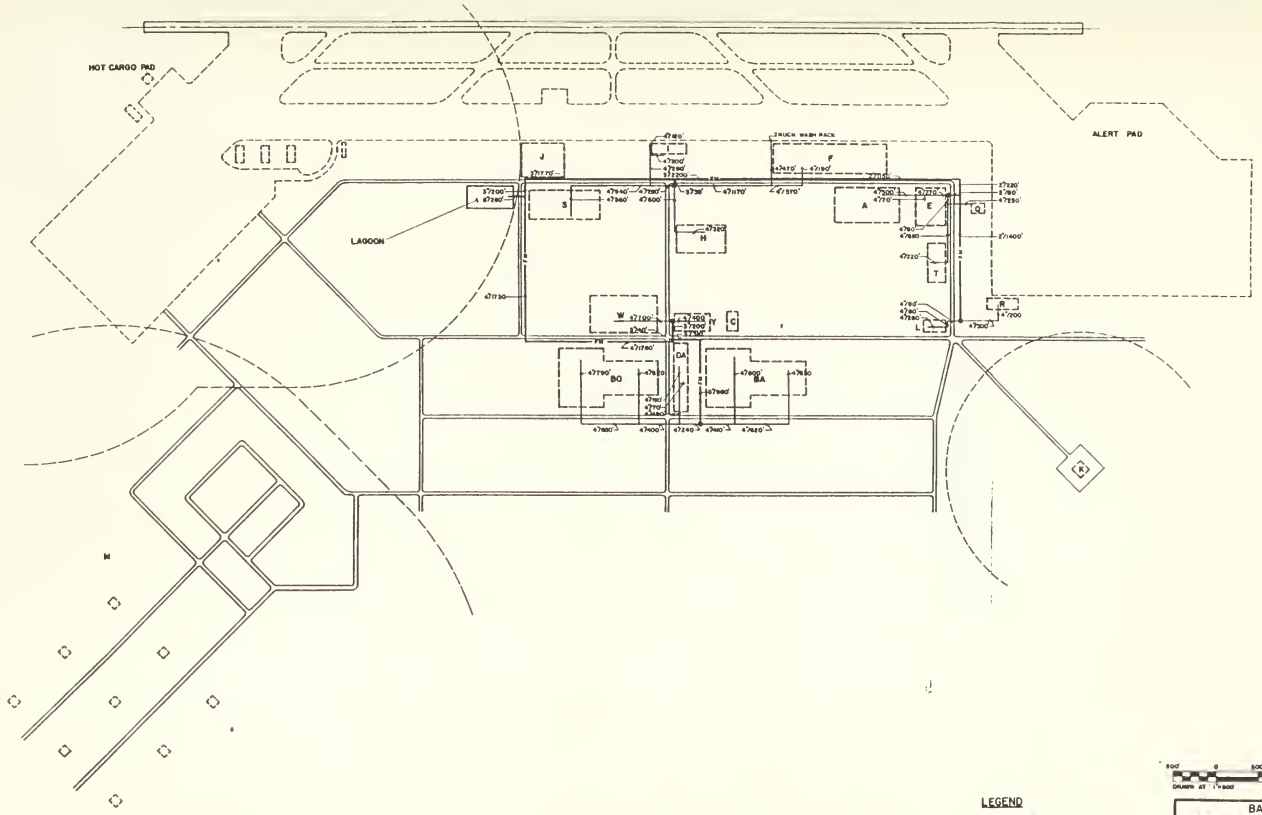
BARE BASE

CONCEPTUAL PLAN

DISPERSED AIR BASE

PRODUCT WATER

POPULATION 750



BARE BASE

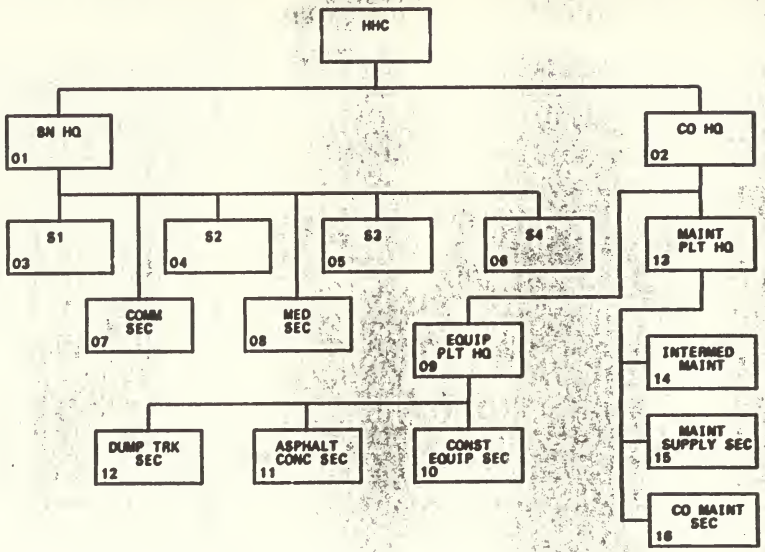
CONCEPTUAL PLAN

DISPERSED AIR BASE

FORCE MAIN-SEWAGE

POPULATION 750

APPENDIX J


HHC
BN HQ
01
CO HQ
02
S1
03
S2
04
S3
05
S4
06
MAINT PLT HQ
13
COMM SEC
07
MED SEC
08
EQUIP PLT HQ
09
INTERMED MAINT
14
DUMP TRK SEC
12
ASPHALT CONC SEC
11
CONST EQUIP SEC
10
MAINT SUPPLY SEC
15
CO MAINT SEC
16

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION	GRADE	MOS	BR	DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
						94B2O		P2					1	1	1			1
						94B3O		P2					1	1	1			
						94B4O		P2					1	1	1			1
				ENLISTED TOTAL									204	197	185			22
				SRC : OTAL									223	214	202			28
				RECAPITULATION														
	A03210		C	ACCESSORY OUTFIT GASOLINE FIELD RANGE: ACCOM 50 MEN									1	1	1			
	A12290		A	ADAPTERS PILEDRIVER LEAD: CRANE-SHOVEL TRK MTD 20 TON									1	1	1			
	A23701		B	AIR CONDITIONER: FL/WNDW A/C C 115V 1PH 60CY 6000BTU									1	1	1			
	A32060		B	ALARM CHEMICAL AGENT AUTOMATIC: PORTABLE MANPACK									3	3	3			
	A56243		B	ANALYZER SET ENGINE: PORTABLE SOLID STATE (STE/ICEPM)									1	1	1			
	A72260		A	ANTENNA: RC-292									5	5	5			
	A72260		B	ANTENNA: RC-292									1	1	1			
	B12482		A	BACKHOE CRANE-SHOVEL: 3/4 CU YD 12-1/2T CRLR MTD AND 20T TRK MTD									1	1	1			
	B48518		B	BOOK SET MEDICAL TEXT NO 1:									1	1	1			
	B49272		B	BAYONET-KNIFE: W/SCABBARD FOR M16A1 RIFLE									225	215	203			
	B67768		B	BINOCULAR: MODULAR CONSTRUCTION MIL SCALE RETICLE 7X50MM W/E									5	5	5			
	C04653		A	BOOM EXTENSION MIDDLE CRANE: 10 FT 10TON CRWLR MTD 20TON TRK MTD									1	1	1			
	C05475		A	BOOM JIB CRANE: 15 FT 12-1/2T CRLR MTD AND 20 TON TRK MTD									1	1	1			
	C29490		A	BUCKET CLAMSHELL: 3/4 CU YD									3	3	3			

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION	GRADE	MOS	BR	DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	C30997		A	BUCKET DRAGLINE: 3/4 CU YD									1	1	1			
	C38422		C	BURNER UNIT GASOLINE FIELD RANGE OUTFIT: W/COMPONENTS									4	4	4			
	C68719		B	CABLE TELEPHONE: WD-1/TT DR-8 1/2 KM									12	12	12			
	C68858		B	CABLE TELEPHONE: WD-1/TT RL-159/U 2 KM									15	15	15			
	C86213		B	CAMERA STILL PICTURE: KE-40									1	1	1			
	C89145		C	CAMOUFLAGE SCREEN SYSTEM: WOODLAND LT WT RADAR SCAT W /O SPT SYS									189	189	189			
	C89213		C	CAMOUFLAGE SCREEN SUPPORT SYSTEM: WOODLAND/DESERT PLASTIC POLES									189	189	189			
	D76085		A	CATWALK PILEDRIVER: TELESCOP 3 SECT 8 TO 23 FT									3	3	3			
	D99573		B	CHARGER BATTERY: PP-34/MSM									1	1	1			
	E00533		B	CHARGER RADIAC DETECTOR: PP-1578/PD									3	3	3			
	E10835		C	CHEST HYMNBOOK: W/HANDLES									1	1	1			
	E32535		B	CLEANER STEAM PRESSURE JET: WITH STEAM GEN BASE MTD 100 PSI									2	2	2			
	E70064		B	COMP UNIT RCP: TRK 2 WHL PNEU TIRES GAS DRVN 5 CFM 175 PSI									1	1	1			
	E72804		A	COMP UNIT RTY: AIR TRLR MTD DSL DRVN 250CFM 100PSI									1	1	1			
	F43364		A	CRANE-SHOVEL CRWLR MTD: 12-1/2T W/BOOM 30 FT W/BLK TKLE 12.5T									1	1	1			
	F43429		A	CRANE TRUCK MOUNTED: HYD 25 TON CAT (CCE)									2	2	2			
	F81880		B	DECONTAMINATING APPARATUS POWER DRIVEN SKID MOUNTED: MULTIPURPOS									1	1	1			
	G02204		B	DETECTING SET MINE: PTBL METALLIC AND NON METALLIC									1	1	1			
	G02341		B	DETECTING SET MINE: PTBL METALLIC (AN/PSS-11)									1	1	1			

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	G27844		A	DISTRIB BITUMIN MATRL TANK TY: TRK MTD 1500 GAL (CCE)					2	2	2			
	G44569		B	DRAFTING EQUIPMENT SET BATTALION: CHARTS SKETCHES AND OVERLAYS					1	1	1			
	G76852		B	TEST SET ELEC POWER: 0-33 KW LOAD 50 TO 1000 CPS FREQUENCY RANGE					1	1	1			
	G85202		C	DUPLICATING MACHINE STENCIL PROCESS: BENCH TYPE HAND MTD AUTO FD					1	1	1			
	H31136		B	FACSIMILE SET: AN/TXC-1					2	2	2			
	H32869		A	FAIRLEAD ROLLER AND SHEAVE: 12-1/2T CR-SHVL CRLR 20T CR-SHVL TRK					1	1	1			
	J35813		B	GEN ST DSL ENG: 5KW 60HZ 1-3PH AC 120/208 120/240V TAC UTIL					4	4	4			
	J35835		B	GEN ST DSL ENG: 15KW 60HZ 3PH AC 120/208 240/416V SKD TAC UTIL					1	1	1			
	J45699		A	GEN ST GAS ENG: 3KW 60HZ 1-3PH 120/240 120/208V SKD TAC UTILITY					1	1	1			
	J45699		B	GEN ST GAS ENG: 3KW 60HZ 1-3PH 120/240 120/208V SKD TAC UTILITY					3	3	3			
	J47617		B	GEN ST GAS ENG TM: 5KW 60HZ 2EA MTD ON M116 PU-620					1	1	1			
	J49398		B	GEN ST GAS ENG: 10KW 60HZ 1-3PH AC 120/240 120/208V TAC UTILITY					1	1	1			
	J88275		A	INSTL KIT ELEC EQUIP: MK-2418/VRC F/AN/VRC-46/64 OR AN/GRC-160					5	5	5			
	J88275		B	INSTL KIT ELEC EQUIP: MK-2418/VRC F/AN/VRC-46/64 OR AN/GRC-160					1	1	1			
	J88343		A	INSTALLATION KIT ELEC EQUIP: MK-2419/VRC F/AN/VRC-47 IN M1009					1	1	1			

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
				RECAPITULATION										
	K04697		A	HAMMER PILE DRIVER SELF-POWERED: DSL DRVN 7000 LB MAX WEIGHT					3	3	3			
	K24862		C	HEATER DUCT TYPE PTBL: GAS 250000 BTU WHL MTD					3	3	3			
	K25215		A	HEATER HOT OIL TRLR MOUNTED: ELECTRIC POWERED 2100000BTU OUTPUT					1	1	1			
	K25342		C	HEATER IMMERSION LIQUID FUEL FIRED: 34-3/4 IN LG OF HEATER					12	12	12			
	K52926		B	HOSE ASSEMBLY: NONMETALLIC WATER USE W/PIN ORROCKER LUGWRENCHING					9	9	9			
	K53748		A	HOSE ASSEMBLY: NONMETALLIC FUEL/OIL HYDROCARBON USE BRASS FITTIN					8	8	8			
	K53748		B	HOSE ASSEMBLY: NONMETALLIC FUEL/OIL HYDROCARBON USE BRASS FITTIN					4	4	4			
	K87248		A	INSTL KIT: F/AN/VRC-43 46 53 64 GRC-125 160 IN M34 35 135 211					1	1	1			
	K87248		B	INSTL KIT: F/AN/VRC-43 46 53 64 GRC-125 160 IN M34 35 135 211					2	2	2			
	K87328		B	INSTL KIT: MK-1443/VRC-46 F/VRC-46 INSTL NOT COVERED BY SPEC KIT					1	1	1			
	K87338		B	INS KT: MK-1454/U F/VRC-53 64 GRC125 160 INS NOT CVRD BY SPEC KT					1	1	1			
	K87452		B	INSTALLATION KIT: MK-1813/VRC-49 F/AN/VRC-49 IN M882 OR M892					1	1	1			
	K87454		A	INSTALLATION KIT: MK-1815/GRC-106 F/AN/GRC-106 IN M882 OR M892					1	1	1			
	K87456		A	INSTL KT: MK-1817/GRC F/AN/VRC-48/53/64 GRC-125/160 IN M882 /M892					3	3	3			

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	K87456		B	INSTL KT: MK-1817/GRC F/AN/VRC-46/53/64 GRC-125/160 IN M882 /M892					3	3	3			
	K97750		B	INTERPRETATION KIT PHOTOGRAPHIC:					1	1	1			
	L44595		A	LAUNCHER GRENADE 40 MILLIMETER: SGLE SHOT RIFLE MTD DTCHBLE W/E					4	4	4			
	L44999		C	LAUNCHER ROCKET: PRACTICE M190					4	4	4			
	L48815		A	LEAD SECTION LOWER PILE DRIVER: 10 FT LG					6	6	6			
	L49089		A	LEAD SECTION TOP PILE DRIVER: 15 FT LG					3	3	3			
	L54692		A	LEVEL SURVEY: DUMPY TELES 32 PORM 5 PER CENT DIA MAGNIF PWR					1	1	1			
	L63994		B	LIGHT SET GENERAL ILLUMINATION: 25 OUTLET (ARMY)					3	3	3			
	L76321		A	LOADER SCOOP TYPE: DED 4X4 W/5 CY GP BUCKET (CCE)					2	2	2			
	L85283		B	LUBRICAT-SERV UNIT PWR OPER: TRLR MTD 15 CFM AIR COMP GAS DRVN					2	2	2			
	L91975		A	MACHINE GUN CALIBER .50: HB FLEXIBLE (GROUND AND VEHICLE) W /E					2	2	2			
	L92386		A	MACHINE GUN 7.62 MILLIMETER: LIGHT FLEXIBLE					6	6	6			
	M11895		A	MASK CBR: PROTECTIVE FIELD					225	215	203			
	M26413		B	MEDICAL EQUIPMENT SET GROUND AMBULANCE:					1	1	1			
	M32780		A	MELTER ASPHALT: SKID MTD 750 GPH					2	2	2			
	M52274		B	MES BATTALION AID STATION:					1	1	1			
	M55384		A	MIXER ROTARY TILLER: DSL DRVN SELF PROPEL					1	1	1			
	M60449		B	MULTIMETER DIGITAL: AN/PSM-45					3	3	3			
	M74364		A	MOUNT GUN: RING CAL .50					2	2	2			

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	M75714		A	MOUNT TRIPOD MACHINE GUN: 7.62 MILLIMETER					6	6	6			
	M76101		B	MOUNTER AND DEMOUNTER PNEUMATIC TIRE: STATIONARY 56 TIRE SIZES					1	1	1			
	N04596		B	NIGHT VISION SIGHT CREW SERVED WEAPON: AN/TVS-5					3	3	3			
	N78651		B	PENETROMETER SOIL: SPRING INDICATING AIRFIELD CONE					1	1	1			
	N96741		A	PISTOL CALIBER .45 AUTOMATIC:					20	20	20			
	P11866		A	PNEUMATIC TOOL AND COMPRESSOR OUTFIT: 250 CFM TRLR MTD					1	1	1			
	P40745		A	POWER SUPPLY: PP-4763/GRC					1	1	1			
	P40750		B	POWER SUPPLY: PP-6224/U					3	3	3			
	P96640		A	PUMPING ASSEMBLY FLAMMABLE LIQUID BULK TRANSFER:					3	3	3			
	R19339		B	RADIAC SET: AN/PDR-27					2	2	2			
	R20935		B	RADIACMETER: IM-93/UD					8	6	6			
	R21483		B	RADIACMETER: IM-174/PD					6	6	6			
	R32756		A	RADIO SET: AN/GRC-106					1	1	1			
	R34308		A	RADIO SET: AN/GRC-160					3	3	3			
	R34308		B	RADIO SET: AN/GRC-160					1	1	1			
				RECAPITULATION										
	R53001		A	RADIO SET: AN/VRC-46					6	6	6			
	R53001		B	RADIO SET: AN/VRC-46					7	7	7			
	R54174		A	RADIO SET: AN/VRC-47					1	1	1			
	R55114		B	RADIO SET: AN/VRC-49					1	1	1			
	R78282		A	RADIO SET CONTROL GROUP: AN/GRA-39					2	2	2			

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1 2 3 4	STRENGTH LEVELS 1 2 3	AUG A	TYPE B	CADRE C
	Q78282		B	RADIO SET CONTROL GROUP: AN/GRA-39		3 3 3			
	Q90120		B	RADIO TELETYPEWRITER SET: AN/GRC-142		1 1 1			
	R14154		C	RANGE OUTFIT FIELD GASOLINE:		2 2 2			
	R30662		A	RECEIVER-TRANSMITTER CONTROL GROUP: AN/GRA-6		1 1 1			
	R56742		B	REEL EQUIPMENT: CE-11		8 8 8			
	R59023		B	REELING MACHINE CABLE HAND: RL-31		2 2 2			
	R84904		C	REPRODUCTION SET DIAZO PROCESS:		1 1 1			
	R88696		B	RESUSCITATOR-ASPIRATOR: INTERMITTENT POSITIVE PRESSURE MAN CYCLE		1 1 1			
	R93169		B	RADIO TEST SET: AN/PRM-34()		1 1 1			
	R94977		A	RIFLE 5.56 MILLIMETER: M16A1		204 194 182			
	S00403		A	RIPPING TOOL MTL DR PVNG BRK: STR 3-1/2 IN SH 9-3/4 IN BL SLIT		4 4 4			
	S11711		A	ROLLER MOTORIZED STEEL WHEEL: 2 DRUM TANDEM 10-14 TON (CCE)		1 1 1			
	S11793		A	ROLLER PNEUMATIC: VARIABLE PRESSURE SELF-PROPELLED (CCE)		2 2 2			
	S34508		A	SAW ABRASIVE DISK MASONRY: GAS DRVN 18 IN BLADE		1 1 1			
	S70027		B	SEMITRAILER FLAT BED: BREAKBULK/CONT TRANSPORTER 22-1/2 TON		1 1 1			
	S70594		A	SEMITRAILER LOW BED: 40 TON 6 WHEEL W/E		7 7 7			
	S74832		B	SEMITRAILER VAN: REPAIR PARTS STORAGE 6 TON 4 WHEEL W/E		2 2 2			
	T05026		A	TRUCK UTILITY: TACTICAL 3/4 TON W/E M1009		8 8 8			
	T05028		B	TRUCK UTILITY: TACTICAL 3/4 TON W/E M1009		3 3 3			
	T10138		B	SHOP EQUIP CONTACT MAINT TRK MTD:		3 3 3			

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1 2 3 4	STRENGTH LEVELS 1 2 3	AUG A	TYPE B	CADRE C
	T10275		B	SHOP EQUIP ELEC REP SEMITRLR MTD: ARMY		1 1 1			
	T10549		B	SHOP EQUIP GEN PURP REP SEMITRLR MTD:		1 1 1			
	T13152		B	SHOP EQUIP ORGANZL REP LIGHT TRK MTD:		1 1 1			
	T25726		A	TONE-SIGNALLING ADAPTER: TA-977( )/PT		1 1 1			
	T30377		B	TOOL OUTFIT HYDRAWLIC SYSTEM: TEST AND REPAIR 3/4 TON TLR MTD		1 1 1			
	T38660		B	TRUCK AMBULANCE: TACTICAL 5/4 TON 4X4 M1010		1 1 1			
	T42725		A	TRUCK CONCRETE: MOBILE MIXER 8 CU YD (CCE)		3 3 3			
	T49119		A	TRUCK LIFT FORK: DSL DRVN 10000 LB CAP 48IN LD CTR ROUGH TERRAIN		1 1 1			
	T49255		A	TRUCK LIFT FORK: DSL DRVN 4000 LB CAP ROUGH TERRAIN		2 2 2			
	T59346		A	TRUCK CARGO: TACTICAL 5/4 TON 4X4 W/COMMO KIT		4 4 4			
	T59348		B	TRUCK CARGO: TACTICAL 5/4 TON 4X4 W/COMMO KIT		3 3 3			
	T59414		B	TRUCK CARGO: TACTICAL 5/4 TON 4X4 SHELTER CARRIER W/E M1028		1 1 1			
	T59482		B	TRUCK CARGO: TACTICAL 5/4 TON 4X4 W/E M1008		2 2 2			
	T61171		A	TRUCK TRACTOR: MET 8X8 75000 GVW W/W C/S		7 7 7			
	T96975		A	TRAILER FLAT BED: 15 TON TILT DECK ENGR EQUIP TRANSPORTER (CCE)		3 3 3			
	U10378		C	SPRAY OUTFIT PAINT: 2 GUNS W/COMPRESSOR		1 1 1			
	U12063		A	SPREADER AGGREGATE: TOWED 8 FT SPR		4 4 4			
	U37626		B	STEREOSCOPE LENS-PRISM MIRROR AERL PHOTO INTRPR: 11 1/4IN FCL LG		1 1 1			
	U65480		B	SURGICAL INSTRUMENT AND SUPPLY SET INDIVIDUAL:		9 9 9			

	T10275		B	SHOP EQUIP ELEC REP SEMITRLR MTD: ARMY											1	1	1					
	T10549		B	SHOP EQUIP GEN PURP REP SEMITRLR MTD:											1	1	1					
	T13152		B	SHOP EQUIP ORGANZL REP LIGHT TRK MTD:											1	1	1					
	T25726		A	TONE-SIGNALLING ADAPTER: TA-977( )/PT											1	1	1					
	T30377		B	TOOL OUTFIT HYDRAWLIC SYSTEM: TEST AND REPAIR 3/4 TON TLR MTD											1	1	1					
	T38660		B	TRUCK AMBULANCE: TACTICAL 5/4 TON 4X4 M1010											1	1	1					
	T42725		A	TRUCK CONCRETE: MOBILE MIXER 8 CU YD (CCE)											3	3	3					
	T49119		A	TRUCK LIFT FORK: DSL DRVN 10000 LB CAP 48IN LD CTR ROUGH TERRAIN											1	1	1					
	T49255		A	TRUCK LIFT FORK: DSL DRVN 4000 LB CAP ROUGH TERRAIN											2	2	2					
	T59346		A	TRUCK CARGO: TACTICAL 5/4 TON 4X4 W/COMMO KIT											4	4	4					
	T59346		B	TRUCK CARGO: TACTICAL 5/4 TON 4X4 W/COMMO KIT											3	3	3					
	T59414		B	TRUCK CARGO: TACTICAL 5/4 TON 4X4 SHELTER CARRIER W/E M1028											1	1	1					
	T59482		B	TRUCK CARGO: TACTICAL 5/4 TON 4X4 W/E M1008											2	2	2					
	T81171		A	THUCK TRACTOR: MET 8X8 75000 GVW W/W C/S											7	7	7					
	T96975		A	TRAILER FLAT BED: 15 TON TILT DECK ENGR EQUIP TRANSPORTER (CCE)											3	3	3					
	U10376		C	SPRAY OUTFIT PAINT: 2 GUNS W/COMPRESSOR											1	1	1					
	U12063		A	SPREADER AGGREGATE: TOWED 8 FT SPR											4	4	4					
	U37626		B	STEREOSCOPE LENS-PRISM MIRROR AERL PHOTO INTRPR: 11 1/4IN FCL LG											1	1	1					
	U65480		B	SURGICAL INSTRUMENT AND SUPPLY SET INDIVIDUAL:											9	9	9					

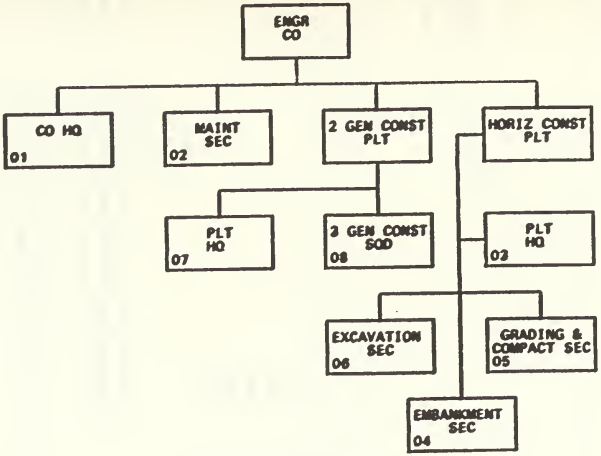
PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	U70179		A	SURVEYING SET GENERAL PURPOSE: PLANIMET CONST AND TOPO SURVEY					3	3	3			
	U76871		B	SWEEPER ROTARY TOWED: GAS DRVN 8 FT LG 30 IN DIA ADJ BRUSH					1	1	1			
	U81707		B	SWITCHBOARD TELEPHONE MANUAL: SB-22/PT					2	2	2			
	U82529		B	SWITCHBOARD TELEPHONE MANUAL: SB-993/GT					2	2	2			
				RECAPITULATION										
	V09730		A	TAGLINE CRANE AND CRANE-SHOVEL: 3/4 TO 1 CU YD BUCKET					3	3	3			
	V12141		A	TANK AND PUMP UNIT LIQUID DISPENSING TRUCKMOUNTING:					3	3	3			
	V19950		A	TANK UNIT LIQUID DISPENSING TRAILER MOUNTING:					3	3	3			
	V26745		B	TARGET SET SURVEYING:					4	4	4			
	V31211		B	TELEPHONE SET: TA-312/PT					16	16	16			
	V64463		A	TEST SET ASPHALT: (ARMY)					1	1	1			
	V89258		B	TEST SET BATTERY: AN/PSM-13					1	1	1			
	V71587		A	TEST SET CONCRETE:					1	1	1			
	V92959		A	TEST SET SOIL: (ARMY)					1	1	1			
	W02673		A	TESTER DENSITY-MOISTURE SOIL-ASPHALT-CONCRETE: NUCLEAR METH(CCE)					3	3	3			
	W32456		B	TOOL KIT AUTOMOTIVE FUEL AND ELECTRICAL SYSTEM REPAIR:					1	1	1			
	W32593		B	SHOP EQUIPMENT AUTO MAINT AND REPAIR: OM COMMON NO 1 LESS POWER					1	1	1			
	W32867		B	SHOP EQUIPMENT AUTO MAINT AND REPAIR: ORG SUPPL NO 1 LESS POWER					1	1	1			
	W33004		B	TOOL KIT GENERAL MECHANICS: AUTOMOTIVE					35	35	35			

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	W34648		B	TOOL KIT CARPENTERS: ENGINEER SQUAD W/CHEST					1	1	1			
	W37483		B	TOOL KIT ELECTRIC EQUIPMENT: TK-101/GSQ					1	1	1			
	W44512		B	TOOL KIT MACHINIST: POSTS/CAMPS/STATIONS					1	1	1			
	W45060		B	TOOL KIT GENERAL MECHANICS: EQUIPMENT MAINTENANCE AND REPAIR					2	2	2			
	W51910		B	TOOL KIT SMALL ARMS REPAIRMAN: ORDNANCE					1	1	1			
	W88575		A	TRACTOR FULL TRCKD LOW SPD: DSL HVY DBP W/ANGDOZ W/WINCH (CCE)					3	3	3			
	W88699		P	TRACTOR FULL TRCKD LOW SPD: DSL HVY DBP W/BULDOZ W/RIPPER (CCE)					3	3	3			
	W95537		B	TRAILER CARGO: 3/4 TON 2 WHEEL W/E					1	1	1			
	W95811		A	TRAILER CARGO: 1-1/2 TON 2 WHEEL W/E					4	4	4			
	W95811		B	TRAILER CARGO: 1-1/2 TON 2 WHEEL W/E					4	4	4			
	W98825		B	TRAILER TANK: WATER 400 GALLON 1-1/2 TON 2 WHEEL W/E					1	1	1			
	X31755		B	TRIPOD SURVEYING: W/HEAD EXT LEGS WOOD 64 IN					2	2	2			
	X40009		A	TRUCK CARGO: 2-1/2 TON 6X6 W/E					2	2	2			
	X40009		B	TRUCK CARGO: 2-1/2 TON 6X6 W/E					6	6	6			
	X40077		B	TRUCK CARGO: DROP SIDE 2-1/2 TON 6X6 W/E					4	4	4			
	X40146		B	TRUCK CARGO: 2-1/2 TON 6X6 W/WINCH W/E					1	1	1			
	X40794		A	TRUCK CARGO: DROP SIDE 5 TON 6X6 W/E					5	5	5			
	X44403		A	TRUCK DUMP: 20 TON DSL DRVN 12 CU YD CAP (CCE)					9	9	9			
	X59326		B	TRUCK TRACTOR: 5 TON 6X6 W/E					3	3	3			
	X63299		A	TRUCK WRECKER: 5 TON 6X6 W/WINCH W/E					1	1	1			

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	X63436		A	TRUCK WRECKER: 10 TON 4X4 W/E					1	1	1			
	Y34027		C	WATCH WRIST: NON MAINTAINABLE					27	27	27			
	Y48323		B	WELDING SHOP TRAILER MOUNTED:					2	2	2			
				REMARKS										
	6B			OFFICER: BATTALION/BRIGADE										
				COMMUNICATIONS-ELECTRONICS STAFF										
				OFFICER										
				WARRANT OFFICER: GENERAL SAFETY										
				TECHNICIAN (NG ONLY)										
	H8			ENLISTED: RECOVERY OPERATIONS										
	Y1			ENLISTED: TRANSITION										
	01			ALSO LIGHT VEHICLE DRIVER										
	04			ALSO RADIO OPERATOR										
	05			ALSO SWITCHBOARD OPERATOR										
	07			ALSO INFORMATION NCO										
	08			ALSO EDUCATION NCO										
	10			ALSO REENLISTMENT NCO										
	11			ARMED WITH PISTOL/REVOLVER										
	27			ALSO OPSEC OFFICER										
	230			ONE PER CHAPLAIN										
	501			USED WITH LIN V92959, V54463 AND R84904										
	502			USED WITH LIN Q55114										

APPENDIX K


ENGR CO
CO HQ 01
MAINT SEC 02
2 GEN CONST PLT
HORIZ CONST PLT
PLT HQ 07
2 GEN CONST SQD 08
PLT HQ 03
EXCAVATION SEC 06
GRADING & COMPACT SEC 05
EMBANKMENT SEC 04

1073

SECTION II

PARA	LINE/ LIN	CHG NO	FPC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	D28316		A	DISTRIBUTOR WATER TANK TYPE: 6000 GL SEMITRAILER MTD (CCE)					2	2	2			
	D99573		B	CHARGER RATTERY: PP-34/MSM					1	1	1			
	E00533		6	CHARGER RADIAC DETECTOR: PP-1578/PD					4	4	4			
	E32535		B	CLEANER STEAM PRESSURE JET: WITH STEAM GEN BASE MTD 100 PSI					1	1	1			
	E61616		A	COMPACTOR HIGH SPEED: TAMPING SELF-PROPELLED (CCE)					1	1	1			
	E69105		B	COMP UNIT RCP: AIR REC GAS DRVN 5 CFM 175 PSI					1	1	1			
	E70064		B	COMP UNIT RCP: TRK 2 WHL PNEU TIRES GAS DRVN 5 CFM 175 PSI					1	1	1			
	F43429		A	CRANE TRUCK MOUNTED: HYD 25 TON CAT (CCE)					1	1	1			
	F79334		B	FLOODLIGHT SET TRAILER MOUNTED: 3 FLOODLIGHTS 1000 WATT					4	4	4			
	F91490		A	DEMOLITION SET EXPLOSIVE: INITIATING ELECTRIC AND SEMI ELECTRIC					6	6	6			
	G02204		A	DETECTING SET MINE: PTBL METALLIC AND NON METALLIC					3	3	3			
	G02204		B	DETECTING SET MINE: PTBL METALLIC AND NON METALLIC					1	1	1			
	G02341		A	DETECTING SET MINE: PTBL METALLIC (AN/PSS-11)					5	5	5			
	G02341		B	DETECTING SET MINE: PTBL METALLIC (AN/PSS-11)					1	1	1			
	G66776		A	DRIVER PROJECTILE UNIT POWDER ACTUATED: FOR 1/4 IN SOLID STUD					1	1	1			
	G74783		A	GRADER ROAD MOTORIZED: DSL DRVN HVY (CCE)					3	3	3			
	H31136		B	FACSIMILE SET: AN/TXC-1					1	1	1			
	J35813		B	GEN ST DSL ENG: 5KW 60HZ 1-3PH AC 120/208 120/240V TAC UTIL					2	2	2			
	J45699		A	GEN ST GAS ENG: 3KW 60HZ 1-3PH 120/240 120/208V SKD TAC UTILITY					4	4	4			

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	J45699		B	GEN ST GAS ENG: 3KW 60HZ 1-3PH 120/240 120/208V SKD TAC UTILITY					5	5	5			
	J88275		A	INSTL KIT ELEC EQUIP: MK-2416/VRC F/AN/VRC-46/64 OR AN/GRC-160					6	6	6			
	J88343		A	INSTALLATION KIT ELEC EQUIP: MK-2419/VRC F/AN/VRC-47 IN M1009					1	1	1			
	K24862		C	HEATER DUCT TYPE PTBL: GAS 250000 BTU WHL MTD					1	1	1			
	K25342		C	HEATER IMMERSION LIQUID FUEL FIRED: 34-3/4 IN LG OF HEATER					6	6	6			
	K52926		B	HOSE ASSEMBLY: NONMETALLIC WATER USE W/PIN ORROCKER LUGWRENCHING					6	6	6			
	K53748		B	HOSE ASSEMBLY: NONMETALLIC FUEL/OIL HYDROCARBON USE BRASS FITTIN					6	6	6			
	K87248		A	INSTL KIT: F/AN/VRC-43 46 53 64 GRC-125 160 IN M34 35 135 211					2	2	2			
	K87338		A	INS KT: MK-1454/U F/VRC-53 64 GRC125 160 INS NOT CVRD BY SPEC KT					6	6	6			
	K87454		A	INSTALLATION KIT: MK-1615/GRC-106 F/AN/GRC-106 IN M882 OR M892					1	1	1			
	K87456		A	INSTL KT: MK-1617/GRC F/AN/VRC-46/53/64 GRC-125/160 IN M882 /M892					6	6	6			
	L44595		A	LAUNCHER GRENADE 40 MILLIMETER: SGLE SHOT RIFLE MTD DTCHBLE W/E					4	4	4			
	L54692		B	LEVEL SURVEY: DUMPY TELES 32 PORM 5 PER CENT DIA MAGNIF PWR					1	1	1			
	L63994		B	LIGHT SET GENERAL ILLUMINATION 25 OUTLET (ARMY)					1	1	1			
	L76556		P	LOADER SCOOP TYPE: DSL 2-1/2CU YD HINGE FRME W/MULTI PURP BUCKET					2	2	2			

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	L85283		B	LUBRICAT-SERV UNIT PWR OPER: TRLR MTD 15 CFM AIR COMP GAS DRVN					1	1	1			
	L91975		A	MACHINE GUN CALIBER .50: HB FLEXIBLE (GROUND AND VEHICLE) W /E					3	3	3			
				RECAPITULATION										
	L92386		A	MACHINE GUN 7.62 MILLIMETER: LIGHT FLEXIBLE					10	10	10			
	M11895		A	MASK CBR: PROTECTIVE FIELD					160	139	125			
	M30449		B	MULTIMETER DIGITAL: AN/PSM-45					1	1	1			
	M74364		A	MOUNT GUN: RING CAL .50					3	3	3			
	M75714		A	MOUNT TRIPOD MACHINE GUN: 7.62 MILLI .TER					10	10	10			
	N04596		A	NIGHT VISION SIGHT CREW SERVED WE/ ON: AN/TVS-5					5	5	5			
	N96741		A	PISTOL CALIBER .45 AUTOMATIC:					1	1	1			
	P11866		A	PNEUMATIC TOOL AND COMPRESSOR OUTFIT: 250 CFM TRLR MTD					2	2	2			
	P40745		B	POWER SUPPLY: PP-4763/GRC					1	1	1			
	P40750		B	POWER SUPPLY: PP-6224/U					1	1	1			
	P94496		B	PUMP CENTRF: SUMP PNEU DRVN UNMTD 2-1/2 IN 210 GPM 25 FT HD					4	4	4			
	P95592		B	PUMP UNIT REC PWR DRVN: DIAPH GAS WHL 4IN 100GPM 10FT SUCT LIFT					4	4	4			
	P96640		A	PUMPING ASSEMBLY FLAMMABLE LIQUID BULK TRANSFER:					2	2	2			
	Q19339		B	RADIAC SET: AN/PDR-27					1	1	1			
	Q20935		B	RADIACMETER: IM-93/UD					6	6	6			
	Q21483		B	RADIACMETER: IM-174/PD					4	4	4			
	Q32756		A	RADIO SET: AN/GRC-106					1	1	1			

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	Q34308		A	RADIO SET: AN/GRC-160					15	15	15			
	Q53001		A	RADIO SET: AN/VRC-46					5	5	5			
	Q54174		A	RADIO SET: AN/VRC-47					1	1	1			
	Q78282		A	RADIO SET CONTROL GROUP: AN/GRA-39					2	2	2			
	R14154		C	RANGE OUTFIT FIELD GASOLINE:					4	4	4			
	R30662		A	RECEIVER-TRANSMITTER CONTROL GROUP: AN/GRA-6					1	1	1			
	R56742		B	REEL EQUIPMENT: CE-11					9	9	9			
	R59023		B	REELING MACHINE CABLE HAND: RL-31					1	1	1			
	R93169		B	RADIO TEST SET: AN/PRM-34()					1	1	1			
	R94977		A	RIFLE 5.56 MILLIMETER: M16A1					159	138	124			
	S11793		A	ROLLER PNEUMATIC: VARIABLE PRESSURE SELF-PROPELLED (CCE)					1	1	1			
	S12916		A	ROLLER VIBRATORY: SELF-PROPELLED HIGH IMPACT SINGLE DRUM (CCE)					1	1	1			
	S35741		B	SAW CHAIN: GAS DRVN BAR FRAME W/ACCESS/COMPONENTS					6	6	6			
	S56246		P	SCRAPER EARTH MOVING SELF-PROPELLED: 14-16 CU YD (CCE)					4	4	4			
	S70594		A	SEMITRAILER LOW BED: 40 TON 6 WHEEL W/E					5	5	5			
	T05028		A	TRUCK UTILITY: TACTICAL 3/4 TON W/E M1009					4	4	4			
	T10138		B	SHOP EQUIP CONTACT MAINT TRK MTD:					1	1	1			
	T16988		A	SHOP EQUIP WOODWORK BASE MAINT: TRLR MTD (ARMY)					2	2	2			
	T25726		A	TONE-SIGNALLING ADAPTER: TA-977( )/PT					1	1	1			
	T59346		A	TRUCK CARGO: TACTICAL 5/4 TON 4X4 W/COMMO KIT					4	4	4			
	T59346		B	TRUCK CARGO: TACTICAL 5/4 TON 4X4 W/COMMO KIT					1	1	1			

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	T59482		A	TRUCK CARGO: TACTICAL 5/4 TON 4X4 W/E M1008					1	1	1			
	T91656		A	TRUCK TRACTOR: LET 6X6 66000 GVW W/W C/S					7	7	7			
	U81707		B	SWITCHBOARD TELEPHONE MANUAL: SB-22/PT					1	1	1			
	U82529		B	SWITCHBOARD TELEPHONE MANUAL: SB-993/GT					3	3	3			
	V09730		A	TAGLINE CRANE AND CRANE-SHOVEL: 3/4 TO 1 CU YD BUCKET					1	1	1			
	V11001		B	TAMPER PISTON-HAMMER TYPE ENGINE DRIVEN: (CCE)					2	2	2			
	V12141		A	TANK AND PUMP UNIT LIQUID DISPENSING TRUCKMOUNTING:					2	2	2			
	V19950		A	TANK UNIT LIQUID DISPE[illegible]ING TRAILER MOUNTING:					2	2	2			
	V31211		B	TELEPHONE SET: TA-312/[illegible]					13	13	13			
	V69258		B	TEST SET BATTERY: AN/PSM-13					1	1	1			
				RECAPITULATION										
	W32593		B	SHOP EQUIPMENT AUTO MAINT AND REPAIR: OM COMMON NO 1 LESS POWER					1	1	1			
	W32867		B	SHOP EQUIPMENT AUTO MAINT AND REPAIR: ORG SUPPL NO 1 LESS POWER					1	1	1			
	W33004		B	TOOL KIT GENERAL MECHANICS: AUTOMOTIVE					17	17	17			
	W34511		A	TOOL KIT CARPENTERS: ENGINEER PLATOON W/CHEST					8	8	8			
	W36977		A	TOOL KIT ELECTRICIANS: SET NO 1					6	6	6			
	W37483		B	TOOL KIT ELECTRIC EQUIPMENT: TK-101/GSQ					1	1	1			
	W44923		A	TOOL KIT MASON AND CONCRETE FINISHERS: BRICK STONE AND CONCRETE					6	6	6			
	W48074		A	TOOL KIT PIONEER ENGINEER COMBAT PLATOON: TOOLS FOR MANUAL LABOR					2	2	2			

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	W48348		A	TOOL KIT PIONEER ENGINEER SQUAD: LAND CLR AND BLDG ERECTION					6	6	6			
	W48622		A	TOOL KIT PIPEFITTERS: 1/8 TO 2 IN PIPE					6	6	6			
	W48759		A	TOOL KIT PIPEFITTERS: 2-1/2 TO 4 IN PIPE					2	2	2			
	W50266		A	TOOL KIT RIGGING WIRE ROPE: CUTTING CLAMPING AND SPLICING					4	4	4			
	W51910		B	TOOL KIT SMALL ARMS REPAIRMAN: ORDNANCE					1	1	1			
	W58486		A	TOOL OUTFIT PIONEER PORTABLE ELECTRIC TOOLS: ARMY					2	2	2			
	W76816		P	TRACTOR FULL TRCKD LOW SPD: DSL MED DBP W/BULDOZ W /SCARIF WINCH					2	2	2			
	W83529		P	TRACTOR FULL TRCKD LOW SPD: DSL MED DBP W/BULDOZ W /SCARIF RIPPER					3	3	3			
	W91074		A	TRACTOR WHL IND: DSL W/BACKHOE W/LOADER W/HYD TOOL ATTACH (CCE)					2	2	2			
	W95537		B	TRAILER CARGO: 3/4 TON 2 WHEEL W/E					1	1	1			
	W95811		A	TRAILER CARGO: 1-1/2 TON 2 WHEEL W/E					2	2	2			
	W95811		B	TRAILER CARGO: 1-1/2 TON 2 WHEEL W/E					11	11	11			
	W98825		B	TRAILER TANK: WATER 400 GALLON 1-1/2 TON 2 WHEEL W/E					1	1	1			
	X11320		B	TRANSIT POCKET: CLINOMETER 0 TO 90 DEG ELEVA DEPRES W /CARRY CASE					2	2	2			
	X40009		A	TRUCK CARGO: 2-1/2 TON 6X6 W/E					4	4	4			
	X40009		B	TRUCK CARGO: 2-1/2 TON 6X6 W/E					2	2	2			
	X40794		A	TRUCK CARGO: DROP SIDE 5 TON 6X6 W/E					3	3	3			
	X43708		P	TRUCK DUMP: 5 TON 6X6 W/E					10	10	10			
	X63299		A	TRUCK WRECKER: 5 TON 6X6 W/WINCH W/E					1	1	1			

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	Y02450		A	VIBRATOR CONCRETE: PNEU					4	4	4			
	Y34027		C	WATCH WRIST: NON MAINTAINABLE					/	17	17			
	Y48323		B	WELDING SHOP TRAILER MOUNTED:					1	1	1			
	Y50166		C	WHEELBARROW: GENERAL UTILITY TYPE W/STEEL WHEEL PNEUMATIC TIRE					6	6	6			
				REMARKS										
	H8			ENLISTED: RECOVERY OPERATIONS										
	01			ALSO LIGHT VEHICLE DRIVER										
	04			ALSO RADIO OPERATOR										
	05			ALSO SWITCHBOARD OPERATOR										
	10			ALSO REENLISTMENT NCO										
	11			ARMED WITH PISTOL/REVOLVER										
	212			1 PER CONST EQ MECH LT WVEH/PWR GEN MECH										
	501			USED WITH LIN Q32756& LIN Q53001										
	502			USED WITH LIN W32867										
	504			USED WITH LIN F79334										
	505			USED WITH LIN W58486										
	506			USED WITH LIN T16988										
	700			FAX INCLUDED IN CTA 50-909 WILL BE										
				ISSUED IN LIEU OF										
	760			SUBSTITUTION OF LIN C89085 OR C89128 IS										
				AUTHORIZED WHEN UNIT IS OPERATING IN										

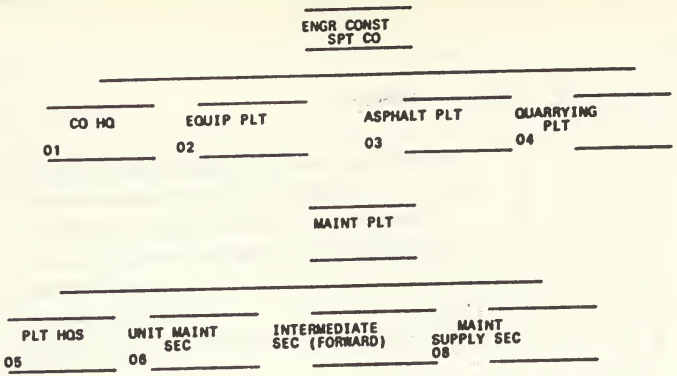
TABLE OF ORGANIZATION AND EQUIPMENT
TOE 05417L000
CHANGE 00
ENGR CO, ENGR CBT BN, HVY

HEADQUARTERS, DEPARTMENT OF THE ARMY
WASHINGTON, D. C.,
1 APRIL 1986

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
				DESERT OR SNOW ENVIRONMENT,										
				RESPECTIVELY										
	782			SUBSTITUTION OF LIN C89070 OR C89064 IS										
				AUTHORIZED WHEN UNIT IS OPERATING IN										
				DESERT OR SNOW ENVIRONMENT,										
				RESPECTIVELY										
	800			MBI AS DIRECTED BY CO										

APPENDIX L


ENGR CONST SPT CO
CO HQ
01
EQUIP PLT
02
ASPHALT PLT
03
QUARRYING PLT
04
MAINT PLT
PLT HQS
05
UNIT MAINT SEC
06
INTERMEDIATE SEC (FORWARD)
MAINT SUPPLY SEC
08

SECTION II

PARA	LINE/ LIN	CMD MO	ERC	DESCRIPTION	GRADE	MOS	BR	DCPC	ASI/SMIS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	A03210		C	ACCESSORY OUTFIT GASOLINE FIELD RANGE: ACCOM 50 MEN									1	1	1		1	
	A12564		A	ADAPTERS PILEDRIVER LEAD: CRANE-SHOVEL CRLR MTD 40 TON									2	2	2		2	
	A32060		B	ALARM CHEMICAL AGENT AUTOMATIC: PORTABLE MANPACK									5	5	5		5	
	A58243		B	ANALYZER SET ENGINE: PORTABLE SOLID STATE (STE/ICEPM)									1	1	1			
	A72280		A	ANTENNA: RC-292									3	3	3		3	
	B07126		B	AXLE CABLE REEL: RL-27									1	1	1			
	B12585		A	BACKHOE CRANE-SHOVEL: 2 CU YD FOR CRANE SHOVEL CRLR MTD 40 TON									1	1	1		1	
	B22717		B	BALL WRECKING: 3 TON									1	1	1		1	
	B63711		A	BIN STORAGE AGGREGATE: PTBL KNOCK DOWN 1 COMP 60 TON									2	2	2		2	
	C05064		A	BOOM EXTENSION MIDDLE CRANE: CRWLR MOUNTED 10 FT 40 TON									4	4	4		4	
	C05612		B	BOOM JIB CRANE: 15 FT 40 TON CRANE SHOVEL CRLR MTD									2	2	2		2	
	C18729		A	BREAKER PAVING: PNEU DRVN 25 LB CLASS									2	2	2		2	
	C29460		A	BUCKET CLAMSHELL: 3/4 CU YD									1	1	1		1	
	C29764		A	BUCKET CLAMSHELL: 2 CU YD									2	2	2		2	
	C30586		A	BUCKET CONCRETE: 2 CU YD									1	1	1		1	
	C31134		A	BUCKET DRAGLINE: 2 CU YD									2	2	2		2	
	C68719		A	CABLE TELEPHONE: WD-1/TT DR-8 1/2 KM									6	6	6		6	
	C68719		B	CABLE TELEPHONE: WD-1/TT DR-8 1/2 KM									19	19	19		14	
	C68856		B	CABLE TELEPHONE: WD-1/TT RL-159/U 2 KM									6	6	6			
	C72872		A	COMP UNIT RTY: AIR WHL DSL DRVN 750 CFM 100 PSI (CCE)									4	4	4		4	
	D28318		A	DISTRIBUTOR WATER TANK TYPE: 6000 GL SEMITRAILER MTD (CCE)									1	1	1			

SECTION II

PARA	LINE/ LIN	CMS MO	EIC	DESCRIPTION	GRADE	MOS	SSI	DCPC	ASI/SMOS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	D76085		A	CATWALK PILEDRIVER: TELESCOP 3 SECT 8 TO 23 FT									2	2	2		2	
	D88573		B	CHARGER BATTERY: PP-34/MSM									2	2	2			
	E00533		B	CHARGER RADIAC DETECTOR: PP-1578/PD									3	3	3		3	
	E02670		B	CHASSIS TRAILER: GENERAL PURPOSE 3-1/2 TON 2 WHEEL W/E									2	2	2		2	
	E32466		B	CLEANER STEAM PRESSURE JET: WHEEL MTD 125 PSI MAX OIL HTD									2	2	2		1	
	E70064		B	COMP UNIT RCP: TRK 2 WHL PNEU TIRES GAS DRVN 5 CFM 175 PSI									1	1	1		1	
	E72804		A	COMP UNIT RTY: AIR TRLR MTD DSL DRVN 250CFM 100PSI									1	1	1		1	
	F08561		B	CONVEYOR BELT: PNEU TIRES ELEC 35 FT LG 432 TON PER HR									4	4	4		4	
	F40474		P	CRANE-SHOVEL CRWLR MTD: W/BOOM 50FT W/BLK TKLE 40 T									4	4	4		4	
	F43429		A	CRANE TRUCK MOUNTED: HYD 25 TON CAT (CCE)									1	1	1		1	
	F49873		A	CRUSH SCREEN AND WASH PLANT: DSL/ELEC DRVN WHL MTD 225TPH (ARMY)									1	1	1		1	
	F41480		B	DEMOLITION SET EXPLOSIVE: INITIATING ELECTRIC AND SEMI ELECTRIC									3	3	3		2	
	G27844		A	DISTRIB BITUMIN MATRL TANK TY: TRK MTD 1500 GAL (CCE)									2	2	2		2	
	G27938		A	DISTRIB LIQ BITUMIN MATRL TNKLESS TY: GAS TRLR MTD 375 GPM									1	1	1		1	
	H32047		A	FAIRLEAD ATTACH: CRANE-SHOVEL CRLR MTD 40 TON									2	2	2		2	
	H79426		B	FLOODLIGHT TELESCOPING TRAILER MOUNTED GENERATOR: SELF CONTAINED									4	4	4			
	J25813		B	GEN ST DSL ENG: 5KW 60HZ 1-2PH AC 120/208 120/240V TAC UTIL									2	2	2			
	J25835		A	GEN ST DSL ENG: 15KW 60HZ 3PH AC 120/208 240/416V SKD TAC UTIL									2	2	2		2	
	J28712		A	GEN ST DSL ENG: 100KW 60HZ 2PH AC 120/208 240/416V 50HZ TAC UTIL									2	2	2		2	

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SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	J45699		B	GEN ST GAS ENG: 3KW 60HZ 1-3PH 120/240 120/208V SKD TAC UTILITY					4	4	4		3	
	J49398		B	GEN ST GAS ENG: 10KW 60HZ 1-3PH AC 120/240 120/208V TAC UTILITY					1	1	1		1	
	KU4697		A	HAMMER PILE DRIVER SELF-POWERED: DSL DRVN 7000 LB MAX WEIGHT					1	1	1		1	
	K04834		A	HAMMER PILE DRIVER SELF-POWERED: DSL DRVN 12000 LB MAX WEIGHT					1	1	1		1	
	K24862		B	HEATER DUCT TYPE PTBL: GAS 250000 BTU WHL MTD					2	2	2		3	
	K25215		A	HEATER HOT OIL TRLR MOUNTED: ELECTRIC POWERED 2100000BTU OUTPUT					2	2	2		2	
	K25342		C	HEATER IMMERSION LIQUID FUEL FIRED: 34-3/4 IN LG OF HEATER					12	12	8		8	
	K53748		B	HOSE ASSEMBLY: NONMETALLIC FUEL/OIL HYDROCARBON USE BRASS FITTIN					8	8	8			
				RECAPITULATION										
	K87243		A	INSTALLATION KIT: MK-1234/G F/AN/VRC-46 53 64 GRC125 160 IN M151					1	1	1		1	
	K87328		B	INSTL KIT: MK-1443/VRC-48 F/VRC-48 INSTL NOT COVERED BY SPEC KIT					1	1	1			
	K87338		B	INS KT: MK-1454/U F/VRC-53 64 GRC125 160 INS NOT CVRD BY SPEC KT					4	4	4		1	
	K87456		A	INSTL KT: MK-1817/GRC F/AN/VRC-46/53/64 GRC-125/160 IN M882 /M892					5	5	5		5	
	L44595		B	LAUNCHER GRENADE 40 MILLIMETER: SGLE SHOT RIFLE MTD DTCHBLE W/E					4	4	4		4	
	L48815		A	LEAD SECTION LOWER PILE DRIVER: 10 FT LG					6	6	6		6	

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SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AMC A	TYPE B	CARRE C
	L49089		A	LEAD SECTION TOP PILE DRIVER: 15 FT LG					2	2	2		2	
	L63994		B	LIGHT SET GENERAL ILLUMINATION: 25 OUTLET (ARMY)					1	1	1		1	
	L76315		A	LOADER SCOOP TYPE: DED 4X4 W/4-1/2 CY ROCK BUCKET (CCE)					2	2	2		2	
	L76321		P	LOADER SCOOP TYPE: DED 4X4 W/5 CY GP BUCKET (CCE)					1	1	1		1	
	L76556		A	LOADER SCOOP TYPE: DSL 2-1/2CU YD HINGE FRME W/MULTI PURP BUCKET					1	1	1		1	
	L85283		B	LUBRICAT-SERV UNIT PWR OPER: TRLR MTD 15 CFM AIR COMP GAS DRVN					2	2	2		2	
	L91975		B	MACHINE GUN CALIBER .50: HB FLEXIBLE (GROUND AND VEHICLE) W /E					1	1	1			
	M11895		A	MASK CBR: PROTECTIVE FIELD					175	162	145		124	
	M32780		A	MELTER ASPHALT: SKID MTD 750 GPH					2	2	2		2	
	M57048		A	MIXING PLANT ASPHALT: DSL ENG 100 TO 150 TON					1	1	1		1	
	M60449		B	MULTIMETER DIGITAL: AN/PSM-45					3	3	3			
	M74364		B	MOUNT GUN: RING CAL .50					1	1	1			
	M76101		B	MOUNTER AND DEMOUNTER PNEUMATIC TIRE: STATIONARY 56 TIRE SIZES					1	1	1		1	
	N75124		A	PAVING MACHINE BITUMINOUS MATERIAL: DIESEL DRVN CRWLR MTD 12 FT					2	2	2		2	
	N96741		B	PISTOL CALIBER .45 AUTOMATIC:					1	1	1		1	
	P12140		A	PNEUMATIC TOOL OUTFIT: FOR 600 CFM COMPRESSOR ARMY					2	2	2		2	
	P40750		B	POWER SUPPLY: PP-6224/U					1	1	1		2	
	P94359		A	PUMP CENTRF: GAS DRVN WHL MTD 60 FT HD 1500 GPM 6 IN					2	2	2		2	
	Q19339		B	RADIAC SET: AN/PDR-27					1	1	1		1	

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	Q20935		B	RADIACMETER: IM-93/UD					10	10	10		9	
	Q21483		B	RADIACMETER: IM-174/PD					5	5	5		5	
	Q53001		A	RADIO SET: AN/VRC-46					2	2	2		2	
	Q53001		B	RADIO SET: AN/VRC-46					1	1	1			
	Q56783		A	RADIO SET: AN/VRC-64					4	4	4		4	
	Q56783		B	RADIO SET: AN/VRC-64					4	4	4		5	
	Q78282		A	RADIO SET CONTROL GROUP: AN/GRA-39					1	1	1		1	
	R14154		C	RANGE OUTFIT FIELD GASOLINE:					3	3	3		3	
	R59023		B	REELING MACHINE CABLE HAND: RL-31					1	1	1			
	R59160		A	REELING MACHINE CABLE HAND: RL-39					1	1	1		1	
	R59160		B	REELING MACHINE CABLE HAND: RL-39					16	18	18		13	
	R94977		B	RIFLE 5.56 MILLIMETER: M16A1					174	161	144		119	
	S00403		B	RIPPING TOOL MTL DR PVNG BRK: STR 3-1/2 IN SH 9-3/4 IN BL SLIT					8	8	8		8	
	S03225		A	ROCK DRILLING EQUIPMENT:					2	2	2		2	
	S11711		A	ROLLER MOTORIZED STEEL WHEEL: 2 DRUM TANDEM 10-14 TON (CCE)					4	4	4		4	
	S11793		A	ROLLER PNEUMATIC: VARIABLE PRESSURE SELF-PROPELLED (CCE)					2	2	2		2	
	S70594		A	SEMITRAILER LOW BED: 40 TON 6 WHEEL W/E					6	6	6		6	
	S73372		A	SEMITRAILER TANK: 5000 GAL FUEL DISPENSING AUTOMOTIVE W/E					1	1	1			
	S74832		B	SEMITRAILER VAN: REPAIR PARTS STORAGE 6 TON 4 WHEEL W/E					2	2	2		2	
	T10138		B	SHOP EQUIP CONTACT MAINT TRK MTD:					4	4			4	
	T10275		B	SHOP EQUIP ELEC REP SEMITRLR MTD: ARMY					1	1	1		1	

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS SR DCPC	AUTHORIZED 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TIME B	CODE C
	T10549		B	SHOP EQUIP GEN PURP REP SEMITRLR MTD:					1	1	1		1	
	T13152		B	SHOP EQUIP ORGANZL REP LIGHT TRK MTD:					1	1	1		1	
				RECAPITULATION										
	T25726		B	TONE-SIGNALLING ADAPTER: TA-977( )/PT					1	1	1			
	T40771		A	SHOVEL FRONT CRANE SHOVEL: CRLR MTD 2 CU YD 40 TON					1	1	1		1	
	T91656		B	TRUCK TRACTOR: LET 6X6 66000 GVW W/W C/S					5	5	5		5	
	U05008		B	SPLICING KIT TELEPHONE CABLE: MK-356/G					1	1	1			
	U12063		A	SPREADER AGGREGATE: TOWED 8 FT SPR					4	4	4		4	
	U76871		A	SWEEPER ROTARY TOWED: GAS DRVN 8 FT LG 30 IN DIA ADJ BRUSH					2	2	2		2	
	U81707		B	SWITCHBOARD TELEPHONE MANUAL: SB-22/PT					1	1	1		1	
	V10141		B	TAGLINE CRANE AND CRANE-SHOVEL: 2 TO 3-1/2 CU YD BUCKET					2	2	2		2	
	V12141		A	TANK AND PUMP UNIT LIQUID DISPENSING TRUCKMOUNTING:					1	1	1		1	
	V12312		A	TANK ASPHALT STORAGE: W/HEAT COILS 5000 GAL					4	4	4		4	
	V15566		A	TANK LIQUID STORAGE METAL: PETRO PRODUCTS SKID MTD 600 GAL					2	2	2		2	
	V19950		A	TANK UNIT LIQUID DISPENSING TRAILER MOUNTING:					1	1	1		1	
	V31211		A	TELEPHONE SET: TA-312/PT					1	1	1		1	
	V31211		B	TELEPHONE SET: TA-312/PT					14	14	14		10	
	V48441		B	TENT: FRAME TYPE MAINTENANCE MEDIUM LIGHT METAL COTTON DUCK OD7					2	2	2			
	V64463		A	TEST SET ASPHALT: (ARMY)					1	1	1		1	
	V92959		A	TEST SET SOIL: (ARMY)					1	1	1		1	
	W02673		A	TESTER DENSITY-MOISTURE SOIL-ASPHALT-CONCRETE: NUCLEAR METH(CCE)					1	1	1		1	

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SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	W32456		B	TOOL KIT AUTOMOTIVE FUEL AND ELECTRICAL SYSTEM REPAIR:					1	1	1		1	
	W32593		B	SHOP EQUIPMENT AUTO MAINT AND REPAIR: OM COMMON NO 1 LESS POWER					1	1	1		1	
	W32867		B	SHOP EQUIPMENT AUTO MAINT AND REPAIR: ORG SUPPL NO 1 LESS POWER					1	1	1		1	
	W33004		B	TOOL KIT GENERAL MECHANICS: AUTOMOTIVE					31	31	31		33	
	W34648		A	TOOL KIT CARPENTERS: ENGINEER SQUAD W/CHEST					2	2	2		2	
	W34648		B	TOOL KIT CARPENTERS: ENGINEER SQUAD W/CHEST					1	1	1		1	
	W44512		B	TOOL KIT MACHINIST: POSTS/CAMPS/STATIONS					2	2	2			
	W45060		B	TOOL KIT GENERAL MECHANICS: EQUIPMENT MAINTENANCE AND REPAIR					1	1	1		1	
	W51910		B	TOOL KIT SMALL ARMS REPAIRMAN: ORDNANCE					1	1	1		1	
	W88575		A	TRACTOR FULL TRCKD LOW SPD: DSL HVY DBP W/ANGDOZ W/WINCH (CCE)					1	1	1		1	
	W88699		A	TRACTOR FULL TRCKD LOW SPD: DSL HVY DBP W/BULDOZ W/RIPPER (CCE)					2	2	2		2	
	W95400		B	TRAILER CARGO: 1/4 TON 2 WHEEL W/E					1	1	1		1	
	W95811		B	TRAILER CARGO: 1-1/2 TON 2 WHEEL W/E					5	5	5		7	
	W96907		B	TRAILER FLAT BED: 10 TON 4 WHEEL W/E					5	5	5		5	
	W98825		B	TRAILER TANK: WATER 400 GALLON 1-1/2 TON 2 WHEEL W/E					1	1	1		1	
	X39432		B	TRUCK CARGO: TACTICAL 1-1/4 TON 4X4 W/E					1	1	1		1	
	X39447		A	TRUCK CARGO: TACTICAL 1-1/4 TON 4X4 W/60 AMP-COMM KITS W/E					5	5	5		5	
	X40009		A	TRUCK CARGO: 2-1/2 TON 6X6 W/E					1	1	1		1	
	X40009		B	TRUCK CARGO: 2-1/2 TON 6X6 W/E					3	3	3		3	

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/SMOS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	X40146		B	TRUCK CARGO: 2-1/2 TON 6X6 W/WINCH W/E					1	1	1		1	
	X40831		A	TRUCK CARGO: 5 TON 6X6 LWB W/E					1	1	1		1	
	X40831		B	TRUCK CARGO: 5 TON 6X6 LWB W/E					1	1	1			
	X44393		A	TRUCK DUMP: 15 TON DSL DRVN					4	4	4		4	
	X44403		A	TRUCK DUMP: 20 TON DSL DRVN 12 CU YD CAP (CCE)					4	4			4	
	X49051		A	TRUCK LIFT FORK: DSL DRVN 10000 LB CAP ROUGH TERRAIN					1	1	1		1	
	X59874		A	TRUCK TRACTOR: 10 TON 6X6 W/MIDSHIP WINCH W/LOW MTD 5TH WHL W/E					2	2	2		2	
	X59874		P	TRUCK TRACTOR: 10 TON 6X6 W/MIDSHIP WINCH W/LOW MTD 5TH WHL W/E					4	4	4			
	X60833		A	TRUCK UTILITY: 1/4 TON 4X4 W/E					1	1	1		1	
	X63436		B	TRUCK WRECKER: 10 TON 4X4 W/E					1	1	1			
	Y34027		C	WATCH WRIST: NON MAINTAINABLE					8	8	8		8	
				RECAPITULATION										
	Y48323		B	WELDING SHOP TRAILER MOUNTED:					2	2	2			
				REMARKS										
	H7			ENLISTED: PETROLEUM VEHICLE OPERATIONS										
	H8			ENLISTED: RECOVERY OPERATIONS										
	01			ALSO LIGHT VEHICLE DRIVER										
	02			ALSO HEAVY VEHICLE DRIVER										
	04			ALSO RADIO OPERATOR										
	05			ALSO SWITCHBOARD OPERATOR										
	10			ALSO REENLISTMENT NCO										

APPENDIX M

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	A12564		A	ADAPTERS PILEDRIVER LEAD: CRANE-SHOVEL CRLR MTD 40 TON					4	4	4		4	
	A32060		B	ALARM CHEMICAL AGENT AUTOMATIC: PORTABLE MANPACK					1	1	1		1	
	A56243		B	ANALYZER SET ENGINE: PORTABLE SOLID STATE (STE/ICEPM)					2	2	2			
	A60814		A	ANCHOR MARINE FLUKED: SWINGING FLUKES W/SHACKLES STEEL 2000 LB					10	10	10		10	
	B07126		B	AXLE CABLE REEL: RL-27					1	1	1		1	
	B12482		A	BACKHOE CRANE-SHOVEL: 3/4 CU YD 12-1/2T CRLR MTD AND 20T TRK MTD					1	1	1		1	
	B22717		B	BALL WRECKING: 3 TON					1	1	1		1	
	B25476		A	BOAT BRIDGE ERECTION INBOARD ENGINE: SHALLOW DRAFT					2	2	2			
	B29964		A	BARGE ASSEMBLY SET: 3 BY 7					1	1	1		1	
	B30238		A	BARGE ASSEMBLY SET: 5 BY 12					5	5	5		5	
	B30512		A	BARGE ASSEMBLY SET: 8 BY 18					4	4	4		4	
	B64896		B	BINDER LOAD: 3000 LB LOAD RATING					24	24	24		24	
	B70040		B	BITT: STEEL 2 POST BASE 40 IN LG BY 13 IN W POSTS 22 IN H M-147					40	40	40		40	
	C04653		A	BOOM EXTENSION MIDDLE CRANE: 10 FT 10TON CRWLR MTD 20TON TRK MTD					2	2	2		2	
	C05064		A	BOOM EXTENSION MIDDLE CRANE: CRWLR MOUNTED 10 FT 40 TON					8	8	8		8	
	C05475		A	BOOM JIB CRANE: 15 FT 12-1/2T CRLR MTD AND 20 TON TRK MTD					2	2	2		2	
	C10352		B	BORER WOOD PNEUMATIC: FOR RD SHANK BIT 1/2IN DIA 2 IN BIT CAP					8	8	8		8	
	C29490		A	BUCKET CLAMSHELL: 3/4 CU YD					2	2	2		2	
	C29764		A	BUCKET CLAMSHELL: 2 CU YD					2	2	2		2	

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	C29901		A	BUCKET CLAMSHELL: 2 CU YD W/TEETH DREDGE TY					2	2	2		2	
	C30586		A	BUCKET CONCRETE: 2 CU YD					2	2	2		2	
	C30997		A	BUCKET DRAGLINE: 3/4 CU YD					1	1	1		1	
	C31134		A	BUCKET DRAGLINE: 2 CU YD					2	2	2		2	
	C34199		A	CRADLE BOAT: BRIDGE ERECTION SHALLOW DRAFT					2	2	2			
	C68856		B	CABLE TELEPHONE: WD-1/TT RL-159/U 2 KM					4	4	4		4	
	C72872		A	COMP UNIT RTY: AIR WHL DSL DRVN 750 CFM 100 PSI (CCE)					4	4	4		4	
	D04161		A	CAP WOOD PILE: FOR 3000 LB HAMMER					2	2	2		2	
	D76085		A	CATWALK PILEDRIVER: TELESCOP 3 SECT 8 TO 23 FT					5	5	5			
	D99573		B	CHARGER BATTERY: PP-34/MSM					1	1	1		1	
	E00533		B	CHARGER RADIAC DETECTOR: PP-1578/PD					1	1	1		1	
	E02807		B	CHASSIS TRAILER: GENERATOR 2-1/2 TON 2 WHEEL W/E					1	1	1			
	E32535		B	CLEANER STEAM PRESSURE JET: WITH STEAM GEN BASE MTD 100 PSI					1	1	1			
	E69242		B	COMP UNIT RCP: AIR REC GAS DRVN 15 CFM 175 PSI					1	1	1		1	
	F40474		A	CRANE-SHOVEL CRWLR MTD: W/BOOM 50FT W/BLK TKLE 40 T					4	4	4		4	
	F40364		A	CRANE-SHOVEL CRWLR MTD: 12-1/2T W/BOOM 30 FT W/BLK TKLE 12.5T					1	1	1		1	
	F43429		A	CRANE TRUCK MOUNTED: HYD 25 TON CAT (CCE)					2	2	2		2	
	F91490		B	DEMOLITION SET EXPLOSIVE: INITIATING ELECTRIC AND SEMI ELECTRIC					2	2	2		2	
	G44569		B	DRAFTING EQUIPMENT SET BATTALION: CHARTS SKETCHES AND OVERLAYS					3	3	3		3	

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
									4	4	4		4	
	G59796		B	DRILL PNEUMATIC PORTABLE: 1 IN MORSE SOCKET NO 3 REVERSIBLE					1	1	1		1	
	G85202		C	DUPLICATING MACHINE STENCIL PROCESS: BENCH TYPE HAND MTD AUTO FD					2	2	2		2	
	H14252		A	ERECTION OUTFIT HIGH BOLTED STORAGE TANKS: STEEL STORAGE TANKS					1	1	1		1	
	H14389		A	ERECTION OUTFIT LOW BOLTED STORAGE TANKS: SINGLE RING TANKS					2	2	2		2	
	H25588		A	EXTRACTOR PILE: PNEU OR STEAM 40 TON					4	4	4		4	
	H32047		A	FAIRLEAD ATTACH: CRANE-SHOVEL CRLR MTD 40 TON					1	1	1		1	
	H32869		A	FAIRLEAD ROLLER AND SHEAVE: 12-1/2T CR-SHVL CRLR 20T CR-SHVL TRK					3	3	3			
	H79221		A	FLOODLIGHT ST ELEC: PTBL 6 LIGHTS MST MTD 5KW 120/208V (ARMY)										
				RECAPITULATION					3	3	3			
	J35813		A	GEN ST DSL ENG: 5KW 60HZ 1-3PH AC 120/208 120/240V TAC UTIL					2	2	2			
	J35813		B	GEN ST DSL ENG: 5KW 60HZ 1-3PH AC 120/208 120/240V TAC UTIL					1	1	1			
	J35825		B	GEN ST DSL ENG: 10KW 60HZ 1-3PH AC 120/208 120/240V TAC UTIL					1	1	1			
	J36109		B	GEN ST DSL ENG: 30KW 60HZ 3PH AC 120/208 240/416V 50HZ TAC UTIL					4	4	4		2	
	J45699		A	GEN ST GAS ENG: 3KW 60HZ 1-3PH 120/240 120/208V SKD TAC UTILITY					1	1	1			
	J45699		B	GEN ST GAS ENG: 3KW 60HZ 1-3PH 120/240 120/208V SKD TAC UTILITY					1	1	1			
	J74852		A	GRADER ROAD MOTORIZED: DSL DRVN HVY 6X4 FRONT-WHL STEER					1	1	1		1	
	J87250		B	GRINDING MACHINE SAW TOOTH: TRIPOD MTG CHAIN SAW BLADE										

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SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	J88275		B	INSTL KIT ELEC EQUIP: MK-2418/VRC F/AN/VRC-46/64 OR AN/GRC-160					2	2	2			
	K04560		A	HAMMER PILE DRIVER DROP: 3000 LB					2	2	2		2	
	K04697		A	HAMMER PILE DRIVER SELF-POWERED: DSL DRVN 7000 LB MAX WEIGHT					6	6	6		6	
	K04834		A	HAMMER PILE DRIVER SELF-POWERED: DSL DRVN 12000 LB MAX WEIGHT					2	2	2		2	
	K24862		B	HEATER DUCT TYPE PTBL: GAS 250000 BTU WHL MTD					2	2	2		2	
	K25342		C	HEATER IMMERSION LIQUID FUEL FIRED: 34-3/4 IN LG OF HEATER					12	12	12		12	
	K35644		B	HINGE ASSEMBLY HEAVY DUTY:					24	24	24		24	
	K37466		B	HOIST CHAIN: HAND 1 1/2 TON 10 FT 1 LOAD CHAIN LEVER AND RAT					4	4	4		4	
	K37877		B	HOIST CHAIN: HAND 3 TON 10 FT 1 LOAD CHAIN DIF					2	2	2		2	
	K38288		B	HOIST CHAIN: HAND OP AUTO BRAKE HOOK SUSP MTD					1	1	1		1	
	K38699		B	HOIST CHAIN: HAND 5 TON 12 FT 1 LOAD CHAIN SPUR GEAR					1	1	1		1	
	K87328		B	INSTL KIT: MK-1443/VRC-46 F/VRC-46 INSTL NOT COVERED BY SPEC KIT					4	4	4			
	K87456		B	INSTL KT: MK-1617/GRC F/AN/VRC-46/53/64 GRC-125/160 IN M882 /M892					3	3	3		2	
	L09820		B	JACK HYDRAULIC HAND: SELF CONTAINED W/O CENTER HOLE PULL SGE PUM					4	4	4		4	
	L09957		B	JACK HYDRAULIC HAND: SELF-CONTAINED UNIT W/CENTER HOLE PULL					2	2	2		2	
	L10368		B	JACK HYDRAULIC HAND: SELF-CONTAINED W/PLUNGER TRAVEL SINGLE PUMP					2	2	2		2	
	L16026		B	JETTING SET PORTABLE: PILE DRIV OPER (ARMY)					2	2	2		2	

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SECTION III

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	L36739		B	LANDING CRAFT MECHANIZED: 69 FT					2	2	2		2	
	L44595		A	LAUNCHER GRENADE 40 MILLIMETER: SGLE SHOT RIFLE MTD DTCHBLE W/E					4	4	4		4	
	L43582		B	LAUNCHING ROLLER: TWO 8 IN DIA WHL WOOD BASE 15IN W 7FT 9IN LG					18	18	18		18	
	L48815		A	LEAD SECTION LOWER PILE DRIVER: 10 FT LG					24	24	24		24	
	L49089		A	LEAD SECTION TOP PILE DRIVER: 15 FT LG					8	8	8		8	
	L63954		B	LIGHT SET GENERAL ILLUMINATION: 25 OUTLET (ARMY)					1	1	1		1	
	L78321		A	LOADER SCOOP TYPE: DED 4X4 W/5 CY GP BUCKET (CCE)					1	1	1		1	
	L85283		B	LUBRICAT-SERV UNIT PWR OPER: TRLR MTD 15 CFM AIR COMP GAS DRVN					2	2	2		2	
	L91975		A	MACHINE GUN CALIBER .50: HB FLEXIBLE (GROUND AND VEHICLE) W /E					4	4	4		4	
	L92386		A	MACHINE GUN 7.62 MILLIMETER: LIGHT FLEXIBLE					4	4	4		4	
	M11895		A	MASK CBR: PROTECTIVE FIELD					207	205	202		208	
	M38985		B	METER VOLT-AMMETER: ME-489/U					1	1	1		1	
	M60449		B	MULTIMETER DIGITAL: AN/PSM-45					2	2	2		2	
	M74364		A	MOUNT GUN: RING CAL .50					2	2	2		2	
	M75577		A	MOUNT TRIPOD MACHINE GUN: HEAVY CALIBER 50					2	2	2		4	
	M75714		A	MOUNT TRIPOD MACHINE GUN: 7.62 MILLIMETER					4	4	4		4	
	N04596		A	NIGHT VISION SIGHT CREW SERVED WEAPON: AN/TVS-5					1	1	1		1	
	N91371		A	PILE DRIVING RIG: SKID MTD 65 FT LG					2	2	2		2	
	N96741		A	PISTOL CALIBER .45 AUTOMATIC:					4	4	4		4	

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	P11868		A	PNEUMATIC TOOL AND COMPRESSOR OUTFIT: 250 CFM TRLR MTD					4	4	4		4	
	P12140		A	PNEUMATIC TOOL OUTFIT: FOR 600 CFM COMPRESSOR ARMY					2	2	2		2	
	P78995		A	PROPELLING UNIT OUTBOARD: DSL 165 BHP					19	19	19		19	
	P92167		A	PUMP CENTRF: GAS DRVN FRAME MTD 2 IN 170 GPM 50 FT HD					2	2	2		2	
				RECAPITULATION										
	P92989		A	PUMP CENTRF: GAS DRVN SKID MTD 4 IN 200 GPM 300 FT HD					2	2	2		2	
	P96503		A	PUMPING ASSEMBLY DEEP WELL: GAS DRVN 50 GPM 250 FT HD					1	1	1		1	
	Q19339		B	RADIAC SET: AN/PDR-27					3	3	3		3	
	Q20935		B	RADIACMETER: IM-93/UD					8	8	8		8	
	Q21483		B	RADIACMETER: IM-174/PD					5	5	5		5	
	Q38299		B	RADIO SET: AN/PRC-77					8	8	8			
	Q53001		B	RADIO SET: AN/VRC-46					6	6	8			
	Q56783		B	RADIO SET: AN/VRC-64					4	4	4			
	R11736		A	RAMP PONTOON LANDING: 30 TON CAP KNOCK-DOWN					4	4	4		4	
	R14154		C	RANGE OUTFIT FIELD GASOLINE:					3	3	3		3	
	R59023		B	REELING MACHINE CABLE HAND: RL-31					1	1	1		1	
	R84904		B	REPRODUCTION SET DIAZO PROCESS:					1	1	1			
	R94977		A	RIFLE 5.56 MILLIMETER: M16A1					203	201	198		204	
	S35741		B	SAW CHAIN: GAS DRVN BAR FRAME W/ACCESS/COMPONENTS					5	5	5			
	S37933		B	SAW POWER HACK PORTABLE: 2 IN TO 8 IN PIPE SIZE BLADE 2 IN STROK					2	2	2		2	
	S64503		B	SEALER STEEL STRAPPING HAND: SINGLE CRIMP SIDE JAW					2	2	2		2	

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	T96975		A	TRAILER FLAT BED: 15 TON TILT DECK ENGR EQU1P TRANSPORTER (CCE)					5	5	5		5	
	U70179		A	SURVEYING SET GENERAL PURPOSE: PLANIMET CONST AND TOPO SURVEY					1	1	1		1	
	U81707		B	SWITCHBOARD TELEPHONE MANUAL: SB-22/PT					2	2	2		2	
	V09730		A	TAGLINE CRANE AND CRANE-SHOVEL: 3/4 TO 1 CU YD BUCKET					1	1	1		1	
	V10141		A	TAGLINE CRANE AND CRANE-SHOVEL: 2 TO 3-1/2 CU YD BUCKET					4	4	4		4	
	V11001		B	TAMPER PISTON-HAMMER TYPE ENGINE DRIVEN: (CCE)					1	1	1		1	
	V12141		A	TANK AND PUMP UNIT LIQUID DISPENSING TRUCKMOUNTING:					1	1	1		1	
	V19950		A	TANK UNIT LIQUID DISPENSING TRAILER MOUNTING:					1	1	1		1	
	V26745		B	TARGET SET SURVEYING:					2	2	2		2	
	V31211		B	TELEPHONE SET: TA-312/PT					18	18	18		18	
	V48441		B	TENT: FRAME TYPE MAINTENANCE MEDIUM LIGHT METAL COTTON DUCK OD7					2	2	2		2	
	V73742		B	TEST SET DIESEL INJECTOR:					1	1	1		1	
	V92959		B	TEST SET SOIL: (ARMY)					1	1	1		1	
				RECAPITULATION										
	W32456		B	TOOL KIT AUTOMOTIVE FUEL AND ELECTRICAL SYSTEM REPAIR:					1	1	1		1	
	W32730		B	SHOP EQUIPMENT AUTO MAINT AND REPAIR: OM COMMON NO 2 LESS POWER					1	1	1		1	
	W33004		A	TOOL KIT GENERAL MECHANICS: AUTOMOTIVE					4	4	4		4	
	W33004		B	TOOL KIT GENERAL MECHANICS: AUTOMOTIVE					26	26	26		27	
	W33689		B	TOOL KIT: BODY AND FENDER					1	1	1		1	

SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS SPEC BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	S70584		A	SEMITRAILER LOW BED: 40 TON 6 WHEEL W/E					2	2	2		2	
	S70661		A	SEMITRAILER LOW BED: HEAVY EQUIPMENT TRANSPORTER 60 TON W/E					2	2	2		2	
	S74832		B	SEMITRAILER VAN: REPAIR PARTS STORAGE 6 TON 4 WHEEL W/E					2	2	2		2	
	T05028		A	TRUCK UTILITY: TACTICAL 3/4 TON W/E M1009					3	3	3		2	
	T10138		B	SHOP EQUIP CONTACT MAINT TRK MTD:					4	4	4		4	
	T10275		B	SHOP EQUIP ELEC REP SEMITRLR MTD: ARMY					1	1	1		1	
	T10549		B	SHOP EQUIP GEN PURP REP SEMITRLR MTD:					1	1	1		1	
	T13152		B	SHOP EQUIP ORGANZL REP LIGHT TRK MTD:					1	1	1		1	
	T16988		A	SHOP EQUIP WOODWORK BASE MAINT: TRLR MTD (ARMY)					2	2	2		2	
	T30377		B	TOOL OUTFIT HYDRAWLIC SYSTEM: TEST AND REPAIR 3/4 TON TLR MTD					1	1	1			
	T30414		B	SHOP EQUIPMENT FUEL AND ELECT SYSTEM ENGINE: FM BAS LESS POWER					1	1	1		1	
	T40565		A	SHOVEL FRONT CRANE-SHOVEL: CRLR MTD 3/4 CUYD 12-1/2 TON					1	1	1		1	
	T40771		A	SHOVEL FRONT CRANE SHOVEL: CRLR MTD 2 CU YD 40 TON					2	2	2		2	
	T42725		A	TRUCK CONCRETE: MOBILE MIXER 8 CU YD (CCE)					1	1	1		1	
	T49119		A	TRUCK LIFT FORK: DSL DRVN 10000 LB CAP 48IN LD CTR ROUGH TERRAIN					2	2	2			
	T59346		A	TRUCK CARGO: TACTICAL 5/4 TON 4X4 W/COMMO KIT					2	2	2		2	
	T59346		B	TRUCK CARGO: TACTICAL 5/4 TON 4X4 W/COMMO KIT					1	1	1			
	T59482		A	TRUCK CARGO: TACTICAL 5/4 TON 4X4 W/E M1008					2	2	2		2	
	T61171		A	TRUCK TRACTOR: MET 8X8 75000 GVW W/W C/S					4	4	4			

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SECTION II

PARA	LINE/ LIN	CHG NO	ERC	DESCRIPTION GRADE MOS BR DCPC	ASI/RMKS 1	2	3	4	STRENGTH LEVELS 1	2	3	AUG A	TYPE B	CADRE C
	W67843		B	TORCH OUTFIT CUTTING AND WELDING: SET 2					4	4	4		4	
	W69528		P	TOWBAR MOTOR VEHICLE: WHEELED VEHICLE					1	1	1		1	
	W76816		A	TRACTOR FULL TRCKD LOW SPD: DSL MED DBP W/BULDOZ W /SCARIF WINCH					3	3	3		3	
	W91074		A	TRACTOR WHL IND: DSL W/BACKHOE W/LOADER W/HYD TOOL ATTACH (CCE)					1	1	1			
	W94536		B	TRAILER BOLSTER: GENERAL PURPOSE 4 TON 4 WHEEL W/E					2	2	2		2	
	W94852		A	TRAILER BOLSTER: SWIVEL BOLSTER 9 TON 4 DUAL WHEELS W/E					2	2	2		2	
	W95811		A	TRAILER CARGO: 1-1/2 TON 2 WHEEL W/E					2	2	2		2	
	W95811		B	TRAILER CARGO: 1-1/2 TON 2 WHEEL W/E					7	7	7		7	
	W98825		B	TRAILER TANK: WATER 400 GALLON 1-1/2 TON 2 WHEEL W/E					1	1	1		1	
	X31755		B	TRIPOD SURVEYING: W/HEAD EXT LEGS WOOD 64 IN					1	1	1		1	
	X39187		A	TRUCK BOLSTER: 5 TON 6X6 W/WINCH W/E					2	2	2		2	
	X40009		A	TRUCK CARGO: 2-1/2 TON 6X6 W/E					9	9	9		9	
	X40009		B	TRUCK CARGO: 2-1/2 TON 6X6 W/E					3	3	3		3	
	X40794		A	TRUCK CARGO: DROP SIDE 5 TON 6X6 W/E					4	4	4		3	
	X43708		A	TRUCK DUMP: 5 TON 6X6 W/E					4	4	4		2	
	X59326		B	TRUCK TRACTOR: 5 TON 6X6 W/E					2	2	2		2	
	X63299		B	TRUCK WRECKER: 5 TON 6X6 W/WINCH W/E					1	1	1		1	
	Y02450		A	VIBRATOR CONCRETE: PNEU					2	2	2		2	
	Y48118		B	TORCH OUTFIT WELDING GAS SHIELDED ARC: DC 115V					1	1	1		1	
	Y48323		A	WELDING SHOP TRAILER MOUNTED:					4	4	4			
	Y48323		B	WELDING SHOP TRAILER MOUNTED:					1	1	1			

APPENDIX N

FACILITY 610508N 1

HEADQUARTERS & UNIT SUPPLY BLDG,COMPANY,
WOOD FRAME W/INTERIOR,20X40XM,TEMP CLIM

MAN HOURS HOR 23 VER 431 GEN 80 TOT 539

MATERIALS SHT TONS 19 MEAS TONS 25 CST$ 4,623

SEC 01 SHELTER COMPONENTS

610508W	3	INTERIOR FOR HEADQUARTERS & UNIT SU	EA	1.0
93111AA	3	WD FR WD RF CNC FND BRKS 20 X 20	EA	1.0
93111AB	3	WD FR WD RF CNC FND BRKS BAY 20 X10	EA	2.0

SEC 07 AIR COOLING, HEATING AND VENTILATION

82510CB	3	ROOF VENT FAN SET 4300 CFM	EA	1.0

FACILITY 610509P 1

HEADQUARTERS & UNIT SUPPLY BLDG,BATTALION,
WOOD FRAME W/INTERIOR,20X100X3,TEMP CLIM

MAN HOURS HOR 65 VER 1269 GEN 270 TOT 1604

MATERIALS SHT TONS 44 MEAS TONS 60 CST$ 11,736

SEC 01 SHELTER COMPONENTS

610509Y	3	INTERIOR FOR HEADQUARTERS & UNIT SU	EA	1.0
93111AA	3	WD FR WD RF CNC FND BRKS 20 X 20	EA	1.0
93111AB	3	WD FR WD RF CNC FND BRKS BAY 20 X10	EA	8.0

FACILITY 610508R 1

ADMINISTRATION,HEADQUARTERS BLDG,30FTX70FTX8FT,WOOD FRAME
W/INTERIOR,USED IN 5000SF INSTALLATION,TEMP CLIM.

MAN HOURS HOR 105 VER 2225 GEN 470 TOT 2800

MATERIALS SHT TONS 49 MEAS TONS 69 CST$ 15,432

SEC 01 SHELTER COMPONENTS

610508A	3	INTERIOR FOR ADMINISTRATION, HEADQU	EA	1.0
93111AE	3	WD FR WD RF CNC FND BRKS 30 X 40	EA	1.0
93111AF	3	WD FR WD RF CNC FND BRKS BAY 30 X10	EA	3.0

FACILITY 610508T 1

ADMINISTRATION,HEADQUARTERS BLDG,30FTX70FTX8FT,WOOD FRAME
W/INTERIOR,USED IN 10000SF INSTALLATION,TEMP CLIM.

MAN HOURS HOR 175 VER 4489 GEN 846 TOT 5510

MATERIALS SHT TONS 49 MEAS TONS 73 CST$ 16,330

SEC 01 SHELTER COMPONENTS

610508B	3	INTERIOR FOR ADMINISTRATION, HEADQU	EA	1.0
93111AE	3	WD FR WD RF CNC FND BRKS 30 X 40	EA	1.0
93111AF	3	WD FR WD RF CNC FND BRKS BAY 30 X10	EA	3.0

FACILITY 610508U 1

INTERIOR FOR ADMINISTRATION SUPPORT BUILDING 30X70X8 FEET
USED IN THE 10000 SQUARE FOOT INSTALLATION.

MAN HOURS HOR VER 540 GEN TOT 540

MATERIALS SHT TONS 2 MEAS TONS 4 CST$ 2,242

SEC 05 INTERIOR CARPENTRY

4210-00-720-1815	EXTINGUISHER FIRE WATER 4GAL HNDPMP	EA	4.0
5315-00-010-4655	NAIL COMMON WIRE STEEL 4D	BX	.6
5315-00-010-4659	NAIL COMMON WIRE STEEL 8D	BX	.1
5315-00-010-4661	NAIL COMMON WIRE STEEL 10D	BX	.1
5315-00-161-6658	NAIL,COMMON WIRE STEEL,DBL HEAD 10D	LB	.1
5315-00-198-3606	NAIL FINISHING 6D X 2 IN LONG	BX	.2
5340-00-234-9521	LATCH THUMB 12 INCH LONG LATCH BAR	EA	1.0

FACILITY 61050BA (CONT) 1

5315-00-178-5606	NAIL FINISHING 6D X 2 IN LONG	BX	.7	
5340-00-234-9521	LATCH THUMB 12 INCH LONG LATCH BAR	EA	4.0	
5340-00-240-2361	LATCH THMB 1GRP	EA	4.0	
5340-00-291-8236	HINGE TEE WROUGHT STL LEAVES 6IN LG	PR	4.0	
5510-00-220-6040	LUMBER SOFTWOOD 8D 2 COM 1X6XRL	BF	137.0	
5510-00-220-6082	LUMBER SOFTWOOD 8D 2 COM 1X8XRL	BF	26.0	
5510-00-220-6194	LUMBER SOFTWOOD DIM 2 COM 2X4XRL	BF	270.0	
5510-00-272-9060	LUMBER SOFTWOOD 8D 2 COM 1X3XRL	BF	24.0	
5510-00-720-0567	LUMBER SOFTWOOD DIM 2 COM 2X2XRL	BF	209.0	
5640-00-106-1630	INSULATION SD VAP BAR 4X8FTX3/8 IN	SH	49.0	
5640-00-527-3756	BUILDING BOARD UNTEMPERED 4X8FTX1/4	SH	50.0	
5640-00-849-9550	BUILDING BOARD TEMPERED 1/4X4X8	SH	16.0	
7510-00-852-8180	TAPE ADHESIVE 2 IN X 36 YDS LONG	RO	9.0	
	SEC 07 AIR COOLING, HEATING AND VENTILATION			
4520-00-540-0557	HEATER SPACE FLR 70000 BTU/ DIESEL	EA	4.0	
5315-00-010-4659	NAIL COMMON WIRE STEEL 8D	BX	.1	
5610-00-236-4952	ASPHALT PETROL WATERPROOFING 2LB CN	CN	4.1	
5970-00-224-5228	INSULATOR KNOB PORCELAIN 2/C 12-14	PG	3.0	
9515-00-230-6695	STEEL SHEET GALV .187X36X120IN	SH	5.5	
	SEC 08 ELECTRICAL SYSTEM			
81231AG 2	ELECT.WIRING KIT FLUORESCENT 30FTC.	KT	13.0	
4710-00-162-1019	PIPE STEEL GALV 3/4INX16-22FT THDS	FT	10.0	
5305-00-013-0384	SCREW,WOOD,10X2.50IN LONG 100/BOX	HD	.1	
5305-00-130-1964	SCREW,WOOD,.164WD,1-1/4IN,STL,CAD	HD	1.8	
5305-00-901-6303	SCREW,WOOD,0.164 WOOD,2ININ,STL,CAD	EA	15.0	
5306-00-281-3721	BOLT MACH,.625-11UNC,12IN W/NUT,GAL	EA	2.0	
5310-00-197-3334	WASHER FLAT SQ 3.00"X.2500X.5125OID	EA	4.0	
5310-00-951-7209	WASHER FLAT 11/16 ID 1-3/4 OD	HD	.1	
5315-00-010-4659	NAIL COMMON WIRE STEEL 8D	BX	.2	
5340-00-050-4659	STRAP RTNG 1.5 IN HVY WALL STL CND	BX	6.0	
5510-00-220-6030	LUMBER SOFTWOOD 8D 2 COM 1X6XRL	BF	30.0	
5510-00-220-6175	LUMBER SOFTWOOD DIM 2 COM 4X4XRL	BF	13.7	
5510-00-720-0567	LUMBER SOFTWOOD DIM 2 COM 2X2XRL	BF	400.0	
5925-00-929-7829	LOAD CTR PNL 120/240V W/4-20A BRKRS	EA	1.0	
5925-00-216-0164	CB PNL1PH.12-20/1	EA	2.0	
5935-01-012-3080	CONNECTOR,RECP DUPL 2P3W 15A 125V	EA	16.0	
5940-00-228-7912	CONN SPLITBOLT NO. 6 OR 6 AWG 10/PG	PG	2.0	
5970-00-419-4291	TAPE ELECTRIC PLASTIC 3/4 INCH WIDE	RO	1.0	
5975-00-100-8779	LOCKNUT,ELECTRICAL,1-1/2IN X 11-1/2	BX	4.0	
5975-00-152-1099	BUSHING 1.5 IN HVY WALL STL CONDUIT	EA	4.0	
5975-00-173-1209	CONDUIT 1.5 INCH RIGID HVY WALL STL	LG	10.0	
5975-00-230-3746	ENTRANCE CAP 1.5 IN HVY STL CONDUIT	EA	1.0	
5975-00-264-7340	TUBE FLEXIBLE INSUL .75 INCH	FT	3.0	
5975-00-285-0905	TUBE FLEXIBLE INSUL .38 IN 250FT/CL	CL	1.0	
5999-00-496-5834	CLAMP ELECT,2-3/8X3/4X2-1/8IN	EA	1.0	
6145-00-990-2999	WIRE 10 AWG SOLID CU 600V THW BLACK	FT	30.0	
6145-01-017-1235	WIRE ELEC 1/C #12 AWG 7ST BLACK	FT	375.0	

FACILITY 61050BA (CONT) 1

6145-01-017-1236	WIRE ELEC 1/C #12 AWG 7ST RED	FT	375.0

FACILITY 61050BB 1

INTERIOR FOR ADMINISTRATION/HEADQUARTERS BLDG,30FTX70FT, USED IN 100005F INSTALLATION.

MAN HOURS HOR VER 1256 GEN TOT 1256

MATERIALS SHT TONS 4 MEAS TONS 23 CST$ 9,624

	SEC 05 INTERIOR CARPENTRY		
4210-00-720-1815	EXTINGUISHER FIRE WATER 4GAL HNDPMP	EA	4.0
5315-00-010-4655	NAIL COMMON WIRE STEEL 4D	BX	1.4
5315-00-010-4659	NAIL COMMON WIRE STEEL 8D	BX	.2
5315-00-010-4661	NAIL COMMON WIRE STEEL 10D	BX	.2
5315-00-161-8658	NAIL,COMMON WIRE STEEL,DBL HEAD 10D	LB	.1
5315-00-178-5606	NAIL FINISHING 6D X 2 IN LONG	BX	.8
5340-00-234-9521	LATCH THUMB 12 INCH LONG LATCH BAR	EA	10.0
5340-00-240-2361	LATCH THMB 1GRP	EA	10.0
5340-00-291-8236	HINGE TEE WROUGHT STL LEAVES 6IN LG	PR	10.0
5510-00-220-6030	LUMBER SOFTWOOD 8D 2 COM 1X6XRL	BF	342.0
5510-00-220-6082	LUMBER SOFTWOOD 8D 2 COM 1X8XRL	BF	64.3
5510-00-220-6194	LUMBER SOFTWOOD DIM 2 COM 2X4XRL	BF	444.0
5510-00-272-9060	LUMBER SOFTWOOD 8D 2 COM 1X3XRL	BF	60.0
5510-00-720-0567	LUMBER SOFTWOOD DIM 2 COM 2X2XRL	BF	247.0
5640-00-106-1630	INSULATION SD VAP BAR 4X8FTX3/8 IN	SH	49.0
5640-00-527-3756	BUILDING BOARD UNTEMPERED 4X8FTX1/4	SH	79.0
5640-00-849-9850	BUILDING BOARD TEMPERED 1/4X4X8	SH	18.0
7510-00-852-8180	TAPE ADHESIVE 2 IN X 36 YDS LONG	RO	9.0
	SEC 07 AIR COOLING, HEATING AND VENTILATION		
4520-00-540-0557	HEATER SPACE FLR 70000 BTU/ DIESEL	EA	4.0
5315-00-010-4661	NAIL COMMON WIRE STEEL 10D	BX	.1
5610-00-236-4952	ASPHALT PETROL WATERPROOFING 2LB CN	CN	3.0
5970-00-224-5228	INSULATOR KNOB PORCELAIN 2/C 12-14	PG	1.9
9515-00-230-6695	STEEL SHEET GALV .187X36X120IN	SH	5.6
	SEC 08 ELECTRICAL SYSTEM		
81231AF 2	ELECT.WIRING KIT FLUORESCENT 20FTC.	KT	2.0
81231AG 2	ELECT.WIRING KIT FLUORESCENT 30FTC.	KT	13.0
4710-00-162-1019	PIPE STEEL GALV 3/4INX16-22FT THDS	FT	10.0
5305-00-013-0384	SCREW WOOD,10X2.50IN LONG 100/BOX	HD	.1
5305-00-130-1964	SCREW,WOOD,.164WD,1-1/4IN,STL,CAD	HD	1.8
5305-00-901-6303	SCREW,WOOD,0.164 WOOD,2ININ,STL,CAD	EA	15.0
5306-00-281-3721	BOLT MACH,.625-11UNC,12IN W/NUT,GAL	EA	2.0
5310-00-197-3334	WASHER FLAT SQ 3.00"X.2500X.5125OID	EA	4.0
5310-00-951-7209	WASHER FLAT 11/16 ID 1-3/4 OD	HD	.1

FACILITY 61050B8 (CONT) 1

5315-00-010-4659	NAIL COMMON WIRE STEEL 8D	BX	.2
5510-00-220-6080	LUMBER SOFTWOOD BD 2 COM 1X6XRL	BF	30.0
5510-00-220-6178	LUMBER SOFTWOOD DIM 2 COM 4X4XRL	BF	18.7
5510-00-720-0567	LUMBER SOFTWOOD DIM 2 COM 2X2XRL	BF	400.0
5925-00-929-7529	LOAD CTR PNL 120/240V W/4-20A BRKRS	EA	1.0
5935-01-012-3080	CONNECTOR,RECP DUPL 2P3W 15A 125V	EA	16.0
5940-00-228-7912	CONN SPLITSOLT NO. 8 OR 6 AWG 10/PG	PG	.3
5970-00-419-4291	TAPE ELECTRIC PLASTIC 3/4 INCH WIDE	RO	.5
5975-00-285-0905	TUBE FLEXIBLE INSUL .38 IN 250FT/CL	CL	.1
5999-00-496-5834	CLAMP ELECT,2-3/8X3/4X2-1/8IN	EA	1.0
6145-00-990-2999	WIRE 10 AWG SOLID CU 600V THW BLACK	FT	30.0
6145-01-017-1235	WIRE ELEC 1/C #12 AWG 7ST BLACK	FT	375.0
6145-01-017-1236	WIRE ELEC 1/C #12 AWG 7ST RED	FT	375.0

FACILITY 61050BC 1

ADMINISTRATION,BLDG,STL FRAME W/INTERIOR,
20X30X8,W/SUPPLY ROOM,TEMP CLIM

MAN HOURS HOR 16 VER 298 GEN 88 TOT 402

MATERIALS SHT TONS 5 MEAS TONS 11 CST$ 9,128

SEC 01 SHELTER COMPONENTS

61050AT	3	INTERIOR FOR ADMINISTRATION BLDG, 2	EA	1.0
93101ED	3	PRE-ENG MTL BLDG,20FTX30FT,TYPE VI	EA	1.0
93111PA	3	FLOOR PH3 CONC W/O REIN 2IN 1000 SF	EA	.6

FACILITY 61050BD 1

ADMINISTRATION BLDG,STL FRAME W/INTERIOR,
20X50X8,W/SUPPLY ROOM,TEMP CLIM

MAN HOURS HOR 27 VER 411 GEN 145 TOT 583

MATERIALS SHT TONS 8 MEAS TONS 17 CST$ 13,949

SEC 01 SHELTER COMPONENTS

61050AU	3	INTERIOR FOR ADMINISTRATION BLDG, 2	EA	1.0
93101EE	3	PRE-ENG MTL BLDG,20FTX50FT,TYPE VI	EA	1.0
93111PA	3	FLOOR PH3 CONC W/O REIN 2IN 1000 SF	EA	1.0

FACILITY 61050BE 1

ADMINISTRATION BLDG,STL FRAME W/INTERIOR,
40X100X8,W/SUPPLY ROOM,TEMP CLIM

MAN HOURS HOR 102 VER 1684 GEN 545 TOT 2331

MATERIALS SHT TONS 32 MEAS TONS 69 CST$ 50,417

SEC 01 SHELTER COMPONENTS

61050AV	3	INTERIOR FOR ADMINISTRATION BLDG, 4	EA	1.0
93101EF	3	PRE-ENG MTL BLDG,40FTX100FT,TYPE II	EA	1.0
93111PA	3	FLOOR PH3 CONC W/O REIN 2IN 1000 SF	EA	4.0

FACILITY 61050BF 1

HEADQUARTERS & UNIT SUPPLY BLDG,COMPANY,
STL FRAME W/INTERIOR,20X40X8,TEMP CLIM

MAN HOURS HOR 32 VER 457 GEN 170 TOT 659

MATERIALS SHT TONS 7 MEAS TONS 15 CST$ 11,731

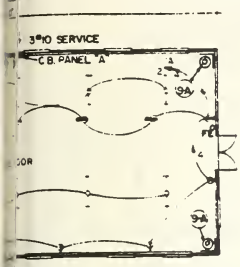
SEC 01 SHELTER COMPONENTS

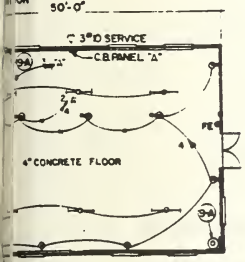
61050AW	3	INTERIOR FOR HEADQUARTERS & UNIT SU	EA	1.0
93101EG	3	PRE-ENG MTL BLDG,20FTX40FT,TYPE VI	EA	1.0
93111PA	3	FLOOR PH3 CONC W/O REIN 2IN 1000 SF	EA	.8

SEC 07 AIR COOLING, HEATING AND VENTILATION

82610CB	3	ROOF VENT FAN SET 4800 CFM	EA	1.0

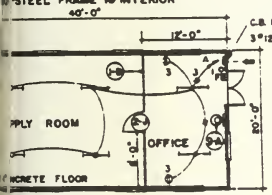
APPENDIX P





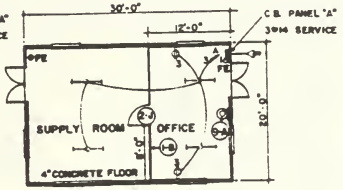
UPPORT - BLDG. 30'X50'

INTERIOR ONLY
WOOD FRAME W/ INTERIOR
STEEL FRAME W/ INTERIOR



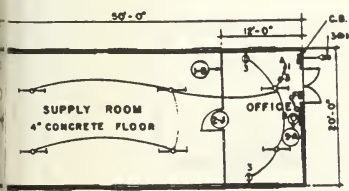
ARTERS & UNIT SUPPLY COMPANY - 20'x40'

8"= 1'-0"
NO. 61050AW - INTERIOR ONLY
NO. 61050BN - WOOD FRAME W/INTERIOR
NO. 61050BF - STEEL FRAME W/INTERIOR



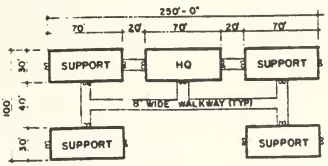
ADMINISTRATION - 20'x30'

SCALE: 1/8" = 1'-0"
FACILITY NO. 61050AT - INTERIOR ONLY
FACILITY NO. 61050BK - WOOD FRAME W/INTERIOR
FACILITY NO 61050BC - STEEL FRAME W/INTERIOR

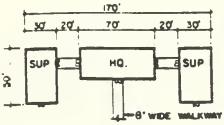


ISTRATION - 20'x50'

1/8" = 1'-0"
NO. 61050AU - INTERIOR ONLY
NO. 61050BL - WOOD FRAME W/INTERIOR
NO. 61050BD - STEEL FRAME W/INTERIOR



TYPICAL LAYOUT (ADMINISTRATION-HQ. W/ SUPPORT-10,000 S.F)
NO SCALE



TYPICAL LAYOUT (ADMIN - HQ. W/SUPPORT - 5,000 S.F)
NO SCALE

ELECTRICAL NOTES

CONNECTED LOAD

FACILITY	LIGHT'G	RECPEST	TOTAL
ADMIN. 20'x30'	200	360	560
ADMIN. 20'x40'	300	360	660
ADMIN. 20'x50'	300	360	660
ADMIN. 20'x100'	1000	—	1000
ADMIN. 40'x100'	1500	1980	3480
ADMIN. HQ. 5,000 S.F			3080
HQ. 30'x70'	700	2880	3580
SUP. 30'x30'	400	2340	2740
ADMIN. HQ. 10,000 S.F.			
HQ. 30'x70'	950	2880	3830
SUP. 30'x70'	600	2700	3300

UNLESS OTHERWISE NOTED ON PLANS, ALL LIGHTING SHALL BE 48" SINGLE 40 WATT FLUORESCENT w/ 10 WATT STARTER & 12" x 48" REFLECTOR

GENERAL NOTES

1. REFER TO TM5-303 FOR BUILDING SHELL REQUIREMENTS.
2. FOR NSN BILL OF MATERIALS, REFER TO TM5-303 BY FACILITY NUMBER.

SCHEDULE OF DRAWINGS

DWG. NO.	DESCRIPTION	SHT. NO.
61050AT	PLANS	1 OF 1
93111AA	WOOD FRAME CONSTRUCTION BARRACKS TYPE BUILDINGS	1-14 OF 14
9998CAA	DETAILS	1-19 OF 19

SYMBOL			

4' 0 8' 16'
1/8" = 1'-0"

JENKINS - FLEMING, INC.
1825 CONNECTICUT AVE., NW
WASHINGTON, D.C. 20009

COORD OF ENGINEERS HUNTSVILLE DIVISION

SUBMITTED BY
CHIEF ENGINEERING DIVISION

AFCE REVIEW
PROJECT ENGINEER — DATE
CHIEF ENGINEER — DATE

FUNCTIONAL LAYOUT APPROVED FOR PROPONENT AGENCY
DATE

APPROVED
CHIEF AFCE BRANCH — DATE

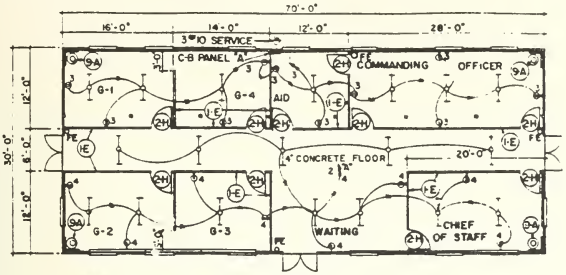
DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C.

ARMY FACILITIES COMPONENTS SYSTEM

ADMINISTRATION HEADQUARTERS & UNIT SUPPLY PLANS

DRAWING NUMBER
61050AT - CB

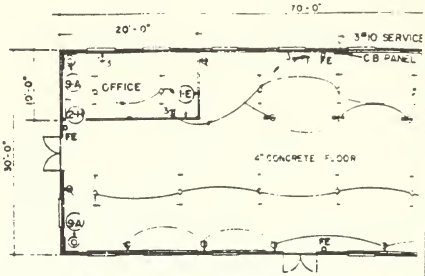
SHEET 1 OF 1



ADMINISTRATION - HEADQUARTERS - BLDG. 30'X70'

SCALE 1/8" = 1'-0"

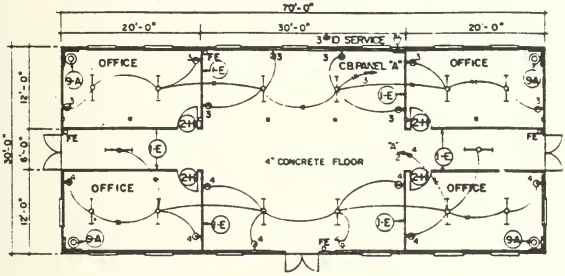
FACILITY NO. 61050BB - INTERIOR ONLY
FACILITY NO. 61050BT - WOOD FRAME W/ INTERIOR
FACILITY NO. 61050BJ - STEEL FRAME W/ INTERIOR



ADMINISTRATION - SUPPORT - BLDG. 30'X70'

SCALE 1/8" = 1'-0"

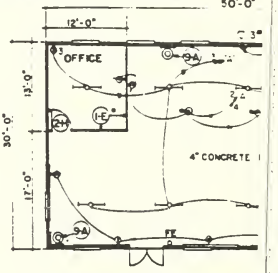
FACILITY NO. 61050BU - INTERIOR ONLY
FACILITY NO. 61050BW - WOOD FRAME W/ INTERIOR
FACILITY NO. 61050CA - STEEL FRAME W/ INTERIOR



ADMINISTRATION - HEADQUARTERS - BLDG. 30'X70'

SCALE 1/8" = 1'-0"

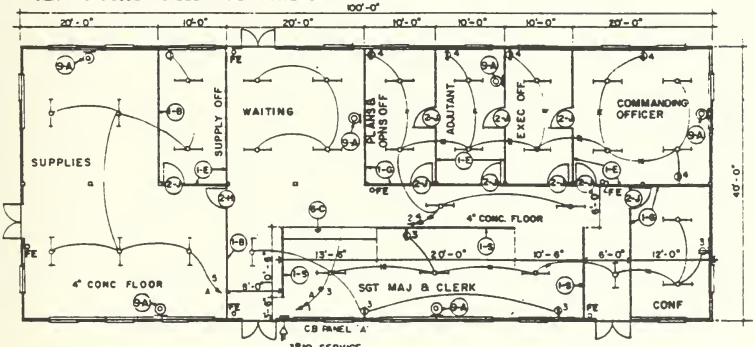
FACILITY NO. 61050BA - INTERIOR ONLY
FACILITY NO. 61050BR - WOOD FRAME W/ INTERIOR
FACILITY NO. 61050BH - STEEL FRAME W/ INTERIOR

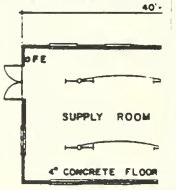


ADMINISTRATION - SUPPORT - BL

SCALE: 1/8" = 1'-0"

FACILITY NO. 61050BV - INTERIOR ONLY
FACILITY NO. 61050BY - WOOD FRAME
FACILITY NO. 61050CB - STEEL FRAM





HEADQUARTERS & U

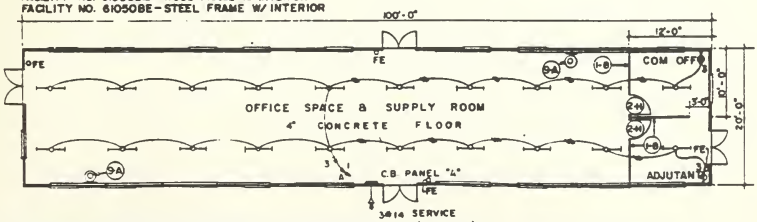
SCALE: 1/8" = 1'-0"

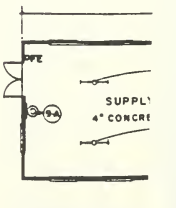
FACILITY NO. 61050AW -
FACILITY NO. 61050BN -
FACILITY NO. 61050BF -

ADMINISTRATION - 40' x 100'

SCALE: 1/8" = 1'-0"

FACILITY NO. 61050AV - INTERIOR ONLY
FACILITY NO. 61050BM - WOOD FRAME W/ INTERIOR
FACILITY NO. 61050BE - STEEL FRAME W/ INTERIOR





HEADQUARTERS & UNIT SUPPLY - BATALLION - 20' x 100'

SCALE: 1/8" = 1'-0"

FACILITY NO. 61050AY - INTERIOR ONLY
FACILITY NO. 61050BP - WOOD FRAME W/INTERIOR
FACILITY NO. 61050BG - STEEL FRAME W/INTERIOR

ADMINISTRATION

SCALE: 1/8" = 1'-0"

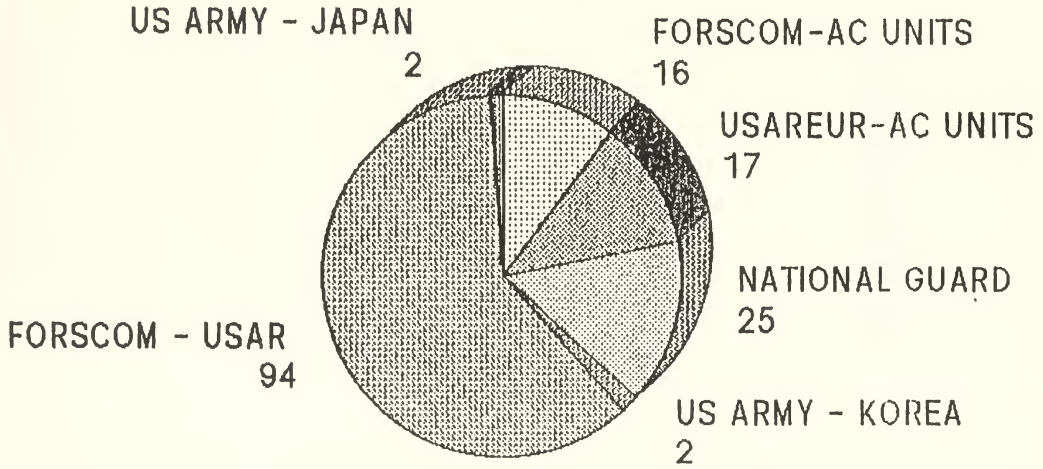
FACILITY NO. 61050A
FACILITY NO. 61050I
FACILITY NO. 61050

APPENDIX Q

Fielding Schedule as of 21 Aug 87

	87	88	89	90	91	92	93	TOTAL
MASH	0	2	6	9	5	2	1	25
CSH	0	1	4	2	5	6	9	27
EVAC	1	10	8	10	2	4	8	43
STA 300	0	0	1	0	3	0	4	8
STA 500	0	0	1	0	1	2	0	4
FIELD	0	2	4	3	3	6	2	20
GEN	0	2	4	4	9	6	4	29
TOTAL	1	17	28	28	28	26	28	156

DISTRIBUTION BY MACOM
156 Hospital Sets



APPENDIX R

Strike the TEMPER. Before moving, the tent must be cleared and all ical equipment disconnected from the power source. Once this is ted, strike the tent by reversing the procedures in paragraph 3-2b n r.

3-3. Shelter, Tactical, Expandable.

a. The shelter, tactical, expandable, also known as ISO, is the hard-walled shelter used in the DEPMEDS hospital system. The ISO shelters employed in the system are either a one-side expandable (2:1) or a two-sided expandable (3:1). The shelters are transported in the closed position. Figure 3-21 depicts an ISO in the closed position. The equipment currently used for transport of the ISO is the M1022 Dolly Set and the 5-ton truck (paragraph 3-5).

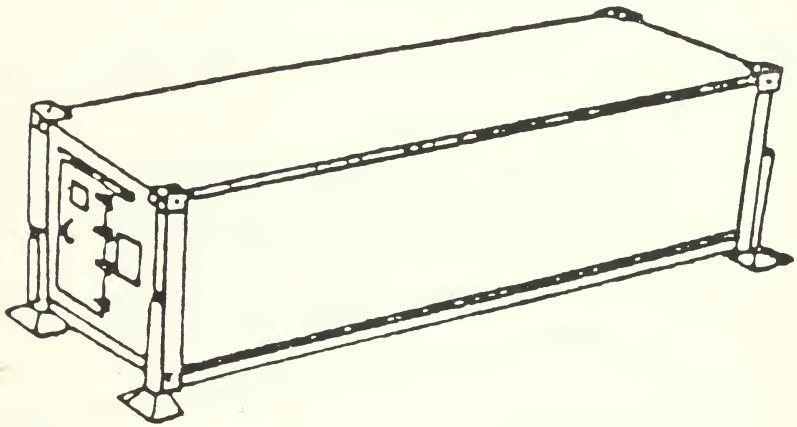


Figure 3-21. ISO in closed position.

b. The 2:1 ISO is used for set up of the following services:

- o X-ray.
- o Pharmacy.
- o Central materiel service.

c. The 3:1 ISO is used for set up of the following services.

- o Operating room.
- o Laboratory (general).

WARNING

At this point, do not stand in front of hinged section (floor/wall) as it weighs 700 pounds.

(6) Flip up and rotate the two cam lock handles (floor locks) on each corner post, bottom cam lock first.

(7) Grasp the top cam lock handle on each corner post and, in unison, rotate handles to full open position--sliding floor/wall section out.

NOTE

If section does not slide open freely, do not try to force. STOP, ensure danger area is clear, and reseat cam locks.

(8) Recheck level indicators and relevel ISO if needed; then repeat steps (6) and (7) above.

NOTE

If floor/wall section will not release (freezing weather) or if it only releases a portion at the top, after above procedures, use the solar bar handles to assist in sliding the section out.

(9) Grasp section at each end and pull down, lowering to full extension of support cables (see Figure 3-22).

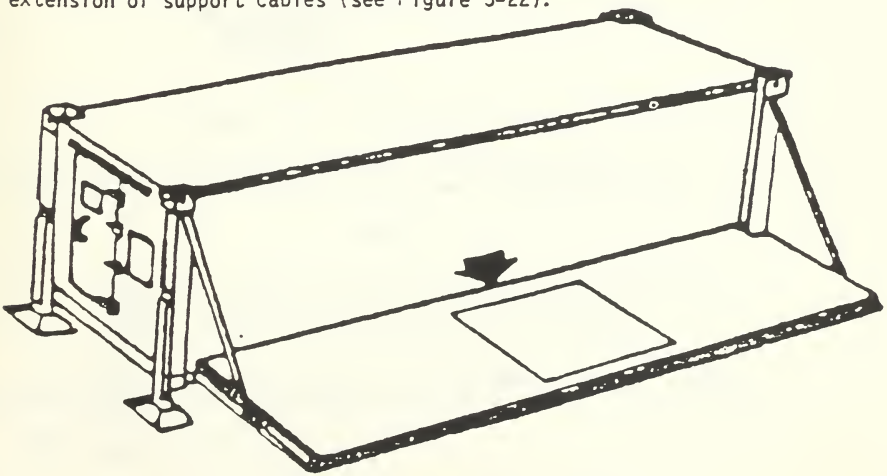


Figure 3-22. Lowering the floor.

(10) Remove quick release pins, flip down stop plates (horseshoes), and replace quick release pins into lower holes.

(11) Obtain two support braces from the toolbox.

(12) Obtain two support jacks from the left cargo door and position them in vicinity of each corner, but clear of the work area.

(13) Place personnel on each side, raise hinged sidewall, and hold in position (see Figure 3-23).

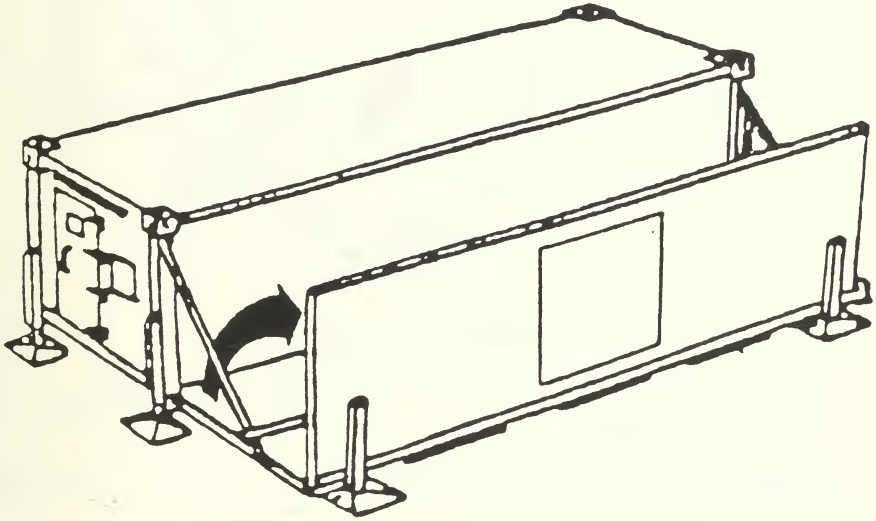


Figure 3-23. Raising the sidewall.

(14) Install both support braces, one on each end, inside cables and in the brace cups on floor and sidewall, while supporting wall.

NOTE

Steps (12), (13), and (14) may be reversed. Adverse weather conditions dictate that wall be supported until endwalls and roof are in position and secured.

(15) Obtain jacks and engage jack attachments into jack support brackets on hinged wall and engage jack lift pins into floor sockets.

(16) Insert safety pins.

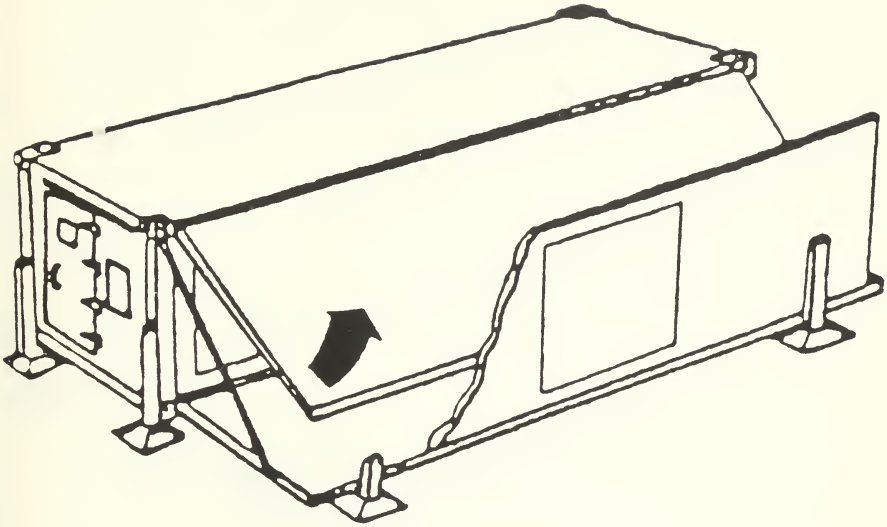


Figure 3-24. Raising the roof.

(24) Swing hinged endwalls out into position and hold in place (see Figure 3-25).

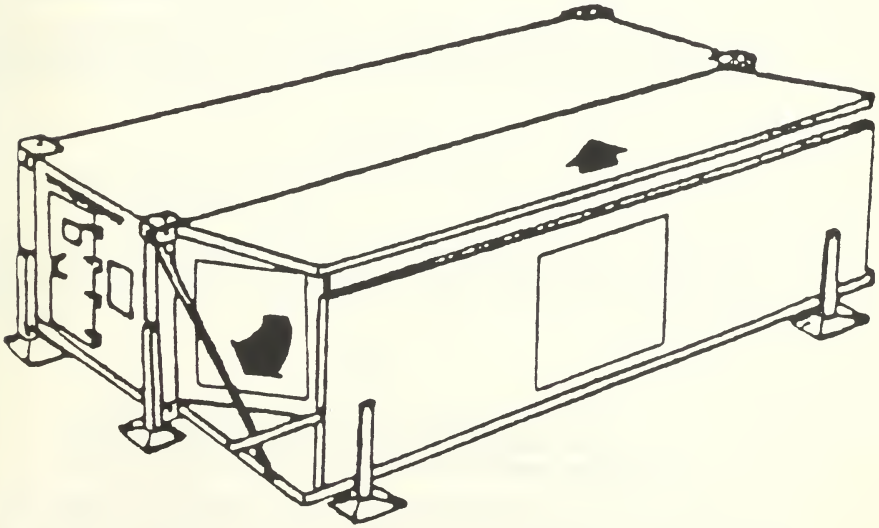


Figure 3-25. Moving the endwall into position.

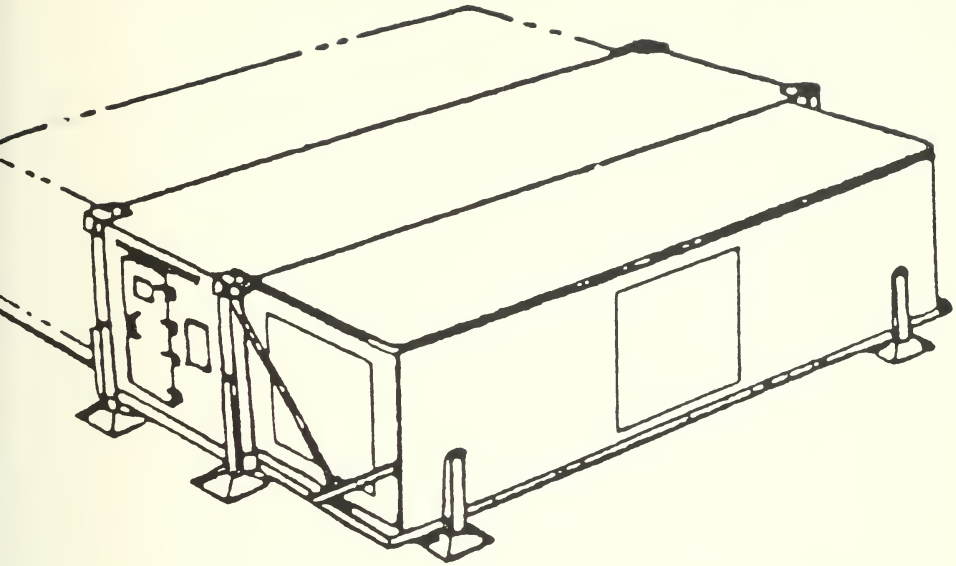


Figure 3-26. Expanded ISO.

h. Installing the accessories.

(1) Remove electrical outlets from their stored locations. Place them on expanded sidewall in designated locations and secure cables with velcro straps at top of walls.

CAUTION

When removing lights and moving them, do not grasp the fluorescent lights.

(2) Remove fluorescent light sets that have cord/plug attached by pushing ceiling plunger lock in with one hand; grasp center of the metal partition with the other hand and slide light set off of retaining tracks (four each).

NOTE

Once light set retaining track moves over the ceiling plunger lock, you can remove your hand in order to place it on light set to prevent dropping it.

(3) Move to expanded side. Locate electrical wall socket and ceiling retaining tracks, and turn light set with cord/plug toward socket.

617-586

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c.1

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